# AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

VOL. 8, No. 24 WEEKLY. | NEW YORK, JUNE 13, 1885. | $2.50 per Annum. SINGLE COPIES, 5 CENTS.



COPYRIGHT, 1885, BY AMERICAN MACHINIST PUBLISHING COMPANY.



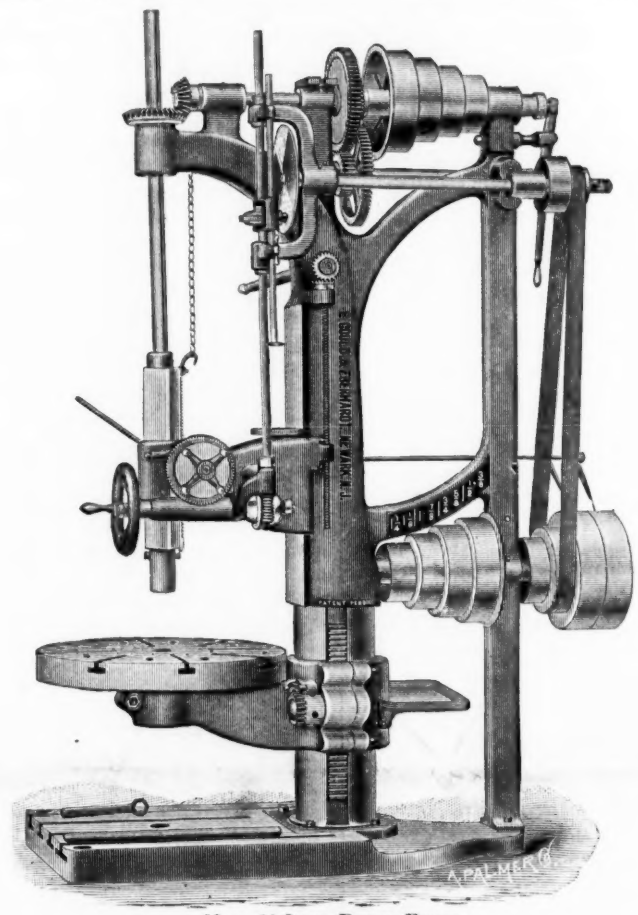
For Sale Everywhere by Newsdealers.

ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.


## New 30-Inch Drill Press.

In drill presses in common use heretofore, much time and labor is lost in ascertaining the proper speed for the drilling tool, as the operator, either through want of knowledge or experience, runs the drill so fast that the cutting edge is soon destroyed, or so slow that much time is lost in operating on the material. The same can also be said of the feeding devices; the operator either feeds so fast that in many cases they are broken, or so slow that instead of cutting, the tools are frequently injured by merely scraping upon the metal. The variations of speed in the feeding device are also generally limited to such as may be obtained by the cones with belts, or cones composed of gears, which are usually provided for changing the speed of the feed. Especially is this noticeable when using drills or reamers of large sizes, which must be driven at a slow speed by the use of the back gearing; as the feed is usually driven by a connection with the spindle driving shaft, the slow speed of such shaft produces a correspondingly slow feed upon the tool used, whether the same be desired or not. Observation frequently shows the coarsest feed to be about $\frac{1}{64}$" fed to one revolution of the drill spindle, when in practice the feed should be from $\frac{1}{16}$" to $\frac{1}{8}$" to one revolution of the spindle.

The ordinary feed devices are too limited in their range and are inconvenient and dangerous to the persons in charge to change, especially when the machine is in motion. The faults, above mentioned, destroy the efficiency of many drill presses about 20 per cent., or in other words, a gain of about 25 per cent. is possible.



NEW 30-INCH DRILL PRESS.

In the drill press shown herewith, a great and gradually varied range of speeds for the feeding device are provided, which may be so accurately adapted to the requirement of the particular tool in use that, it is claimed, the operator can do fully one-quarter more work in the same time than with the limited number of speeds attainable in ordinary construction.

The means ordinarily provided for disconnecting the upper cone from its shaft and engaging the back gear is slow and inconvenient, necessitating two distinct operations, and as the parts are out of the reach of the operator in most large machines, he must provide a step-ladder or other means to gain access to them. The sliding barrel wherein the spindle revolves, which has a rack fastened to it by means of screws, is usually made round. It is sometimes difficult to keep this firm and rigid, as the screws holding the rack often get loose, together with the play on the sides of the rack, caused by continual wear.

The end of the spindle which holds the taper shanks of the drills also become worn out, and it is expensive and inconvenient to put these parts in proper order again. The drifts for ejecting the drills become lost or broken, all of which causes an annoyance and loss of time.

What are claimed as new features and advantages of this machine are:

1st. Having an index which informs the operator at a glance the proper speed he should place the belt for a given size of drill.

2d. Means for automatically feeding the drill spindle up or down, at any desired speed required in practice, and doing it independently of the drill spindle or top cone shaft, so that changing the revolutions of the drill spindle does not affect the rate of feed.

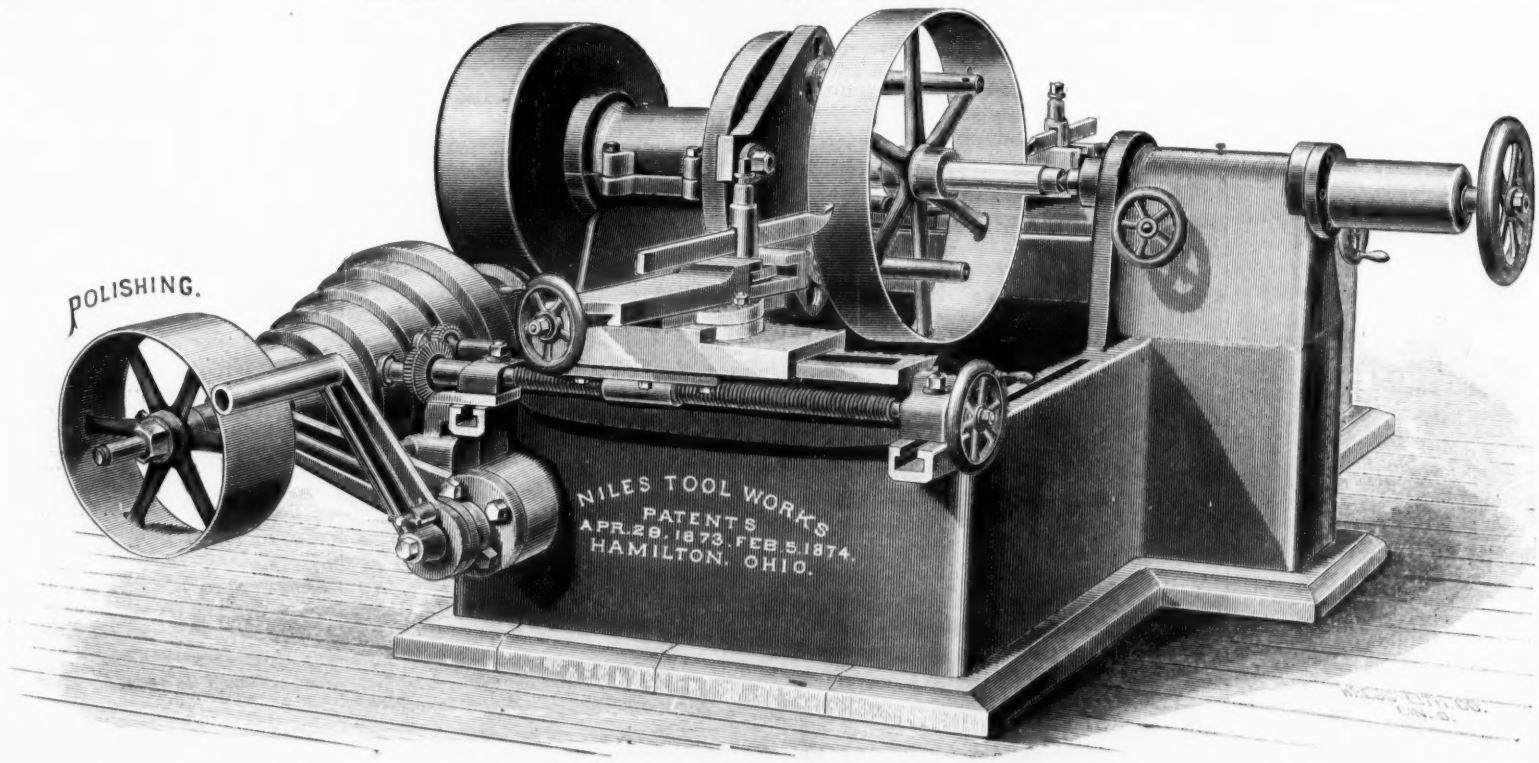
3d. Having an index for the feeding device, which informs the operator at a glance the proper feed for a given drill.

4th. Arranging the back gears so that one movement of a lever releases the cone from its shaft and engages the gearing, while one movement in the opposite direction disengages the gearing and connects the cone again with its shaft.

5th. Constructing the barrel wherein the spindle revolves square and long, using the four sides of the barrel for rigidity, and allowing sufficient space each side of the rack.

6th. Providing that end of the spindle which holds the drill with a hardened steel sliding plug, having a concave slot milled in it, which serves to carry the drill, and also forces the drill out of the spindle when struck with a hammer or mallet.

7th. The T-slots in the table run out to the edge of the table, and are of such a size that standard square-headed bolts bought from the store will fit at once, there being no occasion for having special ones forged.




NEW DESIGN OF PULLEY LATHE—(*For description see page* 2).

In the whole construction, metal appears to have been distributed where it is most needed, and plenty of it. The base is long and wide, with T-slots running lengthwise. All bearings, shafts, and wearing surfaces are made large, and all fits are hand

scraped, no pains being spared in any of these respects.

These drill presses are made in a variety of sizes by E Gould & Eberhardt, Newark, N. J.

### New Design of Pulley Lathe.

The manufacture of pulleys has grown to be a very important industry; many varieties of wrought iron, steel, wood and paper pulleys have been introduced in the past few years to take the place of cast iron pulleys, but still the latter hold their own pretty well, and bid fair to continue so to do. The strong competition in the manufacture of pulleys, and the competition occasioned by the introduction of other varieties of pulleys, have forced the manufacturer of cast iron pulleys to devise new and improved methods for their production. Pulley-moulding machines have been largely introduced. These produce a uniform casting at a very moderate cost. A number of firms are now making a specialty of furnishing pulley castings to the trade, and they are furnishing an excellent pulley from a good quality of iron at a low figure. General jobbing shops and manufacturing establishments, engaged in other lines of business, who attempt to cast their own pulleys, frequently have considerable trouble, from the fact that their pulleys are cast few at a time and run with the same iron as used on other classes of work, consequently the castings frequently come out so hard that a tool will scarcely touch them, or the shrinkage, particularly in the case of straight arm pulleys, ruins the casting. Those foundries that have made a specialty of this work make large numbers of pulleys, use suitable mixtures of iron, run special heats, and make good castings of soft iron which can be finished to good advantage.

For finishing cast iron pulleys special machines have been designed, which reduce the expense of finishing to a minimum. At the price at which pulley castings can be furnished when made on pulley moulding machines, and the cost for finishing them by new and improved methods, it is hard to realize how it will ever be possible to supersede entirely the cast iron pulley. Among the leading machines for finishing pulley is the special pulley turning and boring machinery manufactured by the Niles Tool Works. The machine for turning is illustrated on page 1.

It is designed for turning pulleys only. It is a radical departure from the ordinary engine lathe, most frequently employed for this work. Power is transmitted through tangent gearing, giving a smooth, steady motion, particularly desirable for this class of work, and also adapting the machine to turning gearing of all kinds. The bed is of a square box form, constructed to carry a cross-rail on each side of the center. These cross-rails carry the necessary saddles, rests and tool holders. The bed is graduated, so that these cross-rails can be set accurately at different distances from the center to turn various sizes of pulleys. Each rest has power cross feed, and the front rest has in addition compound movement, with power, cross and angular feed. The pulleys are first bored, then placed upon a mandrel and put between the centers of the turning machine. They are driven by an equalizing driver plate working freely on the face-plate of the machine, and self-adjusting. This plate has arms on opposite sides of the centers which drive against opposite arms of the pulleys. By this arrangement the pulleys are not clamped fast by their arms, consequently are not sprung, and driven as they are, on a mandrel, the pulley when finished comes out true and round. This is a very desirable feature of this lathe. A suitable rest is provided for polishing pulleys when desired. The end of the cone spindle is used for the polishing mandrel, and the operation of polishing can be going on while a pulley is being turned in the lathe. The advantage of this machine in turning gearing, as mentioned above, consists in the fact that the driving gear is always in contact, consequently a heavy cut can be carried on spur or bevel gearing. The tool passes from one tooth to another without jumping, which, it is claimed, makes the machine superior for such work. Bevel or miter wheels with face at any angle can be turned rapidly.

Three sizes of these machines are built, 36," 50" and 60" swing. Old-time methods of boring and turning pulleys must be abandoned, or the concern continuing them must go to the wall, if that is at all an important adjunct of their business. The ordinary practice is to swing a pulley in an engine lathe, and frequently in a lathe blocked up to swing about twice the diameter it was originally built for, then with a single tool and a feed of about 100 to the inch the operation is performed. In this way a 24" pulley can be turned in from four to five hours. On the Niles machine illustrated herewith, feeds of $\frac{1}{4}$" to $\frac{1}{2}$" are taken and the cut carried at a speed of 24' to 30' per minute. In this way pulleys are turned very rapidly.

The following is given us as the actual data of work done at various shops on this machine: Several firms report being able to bore and turn complete 40 pulleys 18" to 20" diameter, 4" face, per day of ten hours. Another firm reports that they have turned 19 pulleys ranging from 20" to 28" diameter 6" to 8" face, in ten hours; 12 pulleys 40' diameter 8" face, in ten hours; 8 pulleys 48" face, in ten hours. One concern reports using the machine on fly-wheels where it is necessary to turn them very accurately for a quick running engine and carry cuts down the sides. They can turn six fly-wheels of this character 42" diameter 10" face in ten hours, and report that this is 75 per cent. more than they were able to do on a heavy 50" lathe.

The above figures, we are informed, are not exceptional, but are a fair statement of the work that can be done daily on this machine. This work requires a stiff, substantial tool, with ample power, driven in an accurate manner, and arranged for convenience in operating and handling work. The Niles pulley machines are claimed to embrace all these features. They are in successful operation in many of the leading shops in this country and Europe.

The Niles Tool Works, of Hamilton, Ohio, have been manufacturing pulley machinery for a number of years, and have met with decided success. The machine illustrated is their latest and most improved design of pulley lathe embodying improvements suggested by years of actual service.

Nothing better illustrates the influence of money than the interest manifested in a company backed by large capital. Plain John Smith will try in vain to find any one interested in his "triple expansion balloon," but the John Smith Manufacturing Company, capital fifteen million dollars, will find plenty of men ready to invest in the scheme.

### Report of a Series of Trials of a Warm Blast Apparatus, for Transferring a Part of the Heat of Escaping Flue Gases to the Furnace.

PRESENTED AT THE MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS BY J. C. HOADLEY, BOSTON, MASS.

The experiments reported in this paper were begun in 1881 at the chemical shops of the Pacific Mills at Lawrence, Mass., by Mr. Fred. H. Prentiss, under the direction of Mr. J. C. Hoadley. The boiler tests lasted nine full weeks. The warm blast apparatus seems to afford a means of securing a net saving of 10 to 18 per cent. over the best attainable practice with natural chimney drafts, and with air supplied to the furnace at usual temperatures of external air.

The objects of the experiments are stated to have been:

1. To ascertain how large a portion of the heat generated in a boiler furnace escapes through the chimney.

2 To ascertain what portion of such escaping heat could practically be arrested to be returned to the furnace in a warm blast by an admissible apparatus.

3. To determine the form and dimensions of such apparatus.

4. To ascertain the cost of running a suction blower to replace the loss of draft in the chimney.

5. To obtain by observation the data for striking a balance of advantages and disadvantages resulting from the use of such apparatus.

6. To obtain as much information as such experiments could be made to yield on all questions relating to the economical combustion of coals and the generation of steam.

In carrying this out, a boiler similar in form, dimensions and setting to all the fifty boilers of the Pacific Mills was tested, to ascertain how near to theoretically perfect conditions that boiler could be brought in actual practice, week by week; to find out just what proportion of the inevitable loss of heat was suffered at the chimney, and what degree of efficiency was attainable. This done, the tests would be repeated with the warm blast apparatus attached to the boiler.

The observations covered coal, refuse, water, air, products of combustion, steam, furnace fire, infiltration through brick-work, and temperatures at all points.

The evaporation tests were each for one week, each day's work being plotted. The fuel was analyzed. The two boilers tested were externally fired return tubular boilers, sixty inches in diameter, twenty feet long, of $\frac{3}{8}$ inch plate, with 60 tubes of $3\frac{1}{2}$ inches diameter.

The abstractors for taking out the heat from the escaping gases, consisted of two sets of iron lap-welded tubes 2 inches in diameter, 120 in a set. Each pipe was incased in a 3-inch tube of light iron. The air passed in the annular space inside the outer casing, the smoke passing through the inner 2-inch tubes. Air was admitted from outside the boiler house, and was drawn through the abstractors into the ash-pit and through the fire by the blower. The casing pipes were so adjusted to the air inlet as to secure equal currents through each tier. In a modified form of abstractor used in the tests the air was drawn *across* the hot pipes several times by means of diaphragm deflectors, and thus made to take up as much heat as possible, while the construction was less costly.

Water grates were tried at first, but leaked a great deal. Long cast iron grates were found to soften under the warm blast, but the Williams rocking-grate with supports at 15 inches was found to answer and diminish the cooling from open fire-doors.

To diminish uncertainties from the infiltration of air through the brick-work, the setting was coated with desiccated tar and shingled with tarred cotton cloth.

The instruments used were a pyrometer as described at page 42 of vol. II. Transactions A.S.M.E., and the present paper gives full tables for its use. In the boiler furnace, two crucibles are set in the fire, containing each a platinum ball. The absorption by the water in the vessel of the heat of the ball enables a simple calculation to show how hot the fire was.

To ascertain the chimney draft an adaptation of the Wollaston anemometer was used, olive oil and a mixture of alcohol and water serving as the two fluids. If the difference in specific gravity is 2 per cent., the instrument will give fifty times the range of a plain U tube with water only. An aneroid incased so that a pipe from the case could establish the pressure in the chimney on the diaphragm was also used. Description is also given of the hygrometers, barometers and thermometers used.

To determine the $CO_2$ gas in the flues the Winckler apparatus was used, and description is given of the Geissler potash bulbs, the chemical balance and the steam and recording gauges.

The general summary of results may be presented as follows:

GENERAL SUMMARY OF RESULTS.

Pacific boiler: cold blast, natural draught.

Warm blast boiler No. 1: abstractors with double tubes.

Warm blast boiler No. 2: abstractors with deflectors, applied to the Pacific boiler.

The results with anthracite, in the Pacific boiler, are the means for five weekly trials; all the others are for single weekly trials:

| | Anthracite. | Bituminous. |
|---|---|---|
| Coal consumed, net, per week: | | |
| Pacific boiler | 16264 | 12890 |
| Warm blast No. 1 | 20368 | 15184 |
| Warm blast No. 2 | 16740 | |
| Water evaporated per week: | | |
| Pacific boiler | 147039 | 121590 |
| Warm blast No. 1 | 180542 | 145073 |
| Warm blast No. 2 | 157483 | |
| Pounds of water per pound of coal: | | |
| Pacific boiler | 9.04 | 9.43 |
| Warm blast No. 1 | 8.86 | 9.55 |
| Warm blast No. 2 | 9.41 | |
| Mean temperature of feed water: | | |
| Pacific boiler (Fah.) | 71.90° | 72.40° |
| Warm blast No. 1 | 38° | 36° |
| Warm blast No. 2 | 49° | |
| Mean temperature of external air, days: | | |
| Pacific boiler (Fah.) | 78.3° | 71° |
| Warm blast No. 1 | 34° | 34.2° |
| Warm blast No. 2 | 49° | |
| Steam gauge pressure above atmosphere, pounds per sq. inch. | | |
| Pacific boiler | 47.54 | 47.30 |
| Warm blast No. 1 | 54.40 | 64.40 |
| Warm blast No. 2 | 42.50 | |
| Mean barometric pressure, pounds per sq. inch: | | |
| Pacific boiler | 14.47 | 14.61 |
| Warm blast No. 1 | 14.64 | 14 66 |
| Warm blast No. 2 | 14.70 | |
| Steam pressure, absolute: | | |
| Pacific boiler | 62.01 | 61.91 |
| Warm blast No. 1 | 69.04 | 79.06 |
| Warm blast No. 2 | 57.20 | |
| Pounds of water evaporated from and at 212° F., per pound of coal, days and nights: | | |
| Pacific boiler | 10.51 | 10.58 |
| Warm blast No. 1 | 10.81 | 11.54 |
| Warm blast No. 2 | 11.12 | |
| Water evaporated from and at 212° F. by day, per pound of coal burned during days and nights: | | |
| Pacific boiler | 9.34 | 9.22 |
| Warm blast No. 1 | 10.60 | 10.72 |
| Warm blast No. 2 | 10 77 | |
| Evaporative power of coal: | | |
| Pacific boiler | 13.56 | 14.27 |
| Warm blast No. 1 | 13.45 | 14.30 |
| Warm blast No. 2 | 13.61 | |
| Efficiency, days and nights: | | |
| Pacific boilers. *per cent.* | 77.48 | 76.43 |
| Warm blast No. 1 | 80 37 | 80.70 |
| Warm blast No. 2 | 81.74 | |
| Efficiency, Days: *per cent.* | | |
| Pacific boiler | 79.96 | 76.53 |
| Warm blast No. 1 | 87.05 | 84.21 |
| Warm blast No. 2 | 87.76 | |
| Efficiency: water, days; coal, days and nights, *per cent.* | | |
| Pacific boiler | 68.87 | 64.61 |
| Warm blast No. 1 | 74.35 | 74.96 |
| Warm blast No. 2 | 79.20 | |
| Losses: *per cent.*, complement of efficiency; water, days only; coal, days and nights. | | |
| Pacific boiler | 31.13 | 25.39 |
| Warm blast No. 1 | 25.65 | 25.04 |
| Warm blast No. 2 | 20.80 | |
| Losses, *per cent.*, at chimney, by radiation from brickwork, and by imperfect combustion, = CO: | | |
| Pacific boiler, chimney | 17.75 | 17.03 |
| Radiation | 2.64 | 3.39 |
| CO | 2.13 | 2 85 |
| | 22.52 | 23.27 |
| Warm blast No. 1, chimney | 15.00 | 14.24 |
| Radiation | 4.00 | 4.00 |
| CO | 0.63 | 1.06 |
| | 19.63 | 19.30 |
| Warm blast No. 2, chimney | 12.83 | |
| Radiation | 4.00 | |
| CO | 1.43 | |
| | 18.26 | |
| Temperature of smoke-box: | | |
| Pacific boiler, F. | 368.3° | 376.9° |
| Warm blast No. 1 | 396.9° | 397.4° |
| Warm blast No. 2 | 377° | |
| Temperature of air supplied to furnace: Fah. | | |
| Pacific boiler | 78.3° | 71° |
| Warm blast No. 1 | 337.7° | 349.5° |
| Warm blast No. 2 | 334° | |
| Temperature of escaping gases: | | |
| Pacific boiler | 368.3° | 376.9° |
| Warm blast No. 1 | 189° | 196° |
| Warm blast No. 2 | 164° | |
| Gases cooled by abstractors: | | |
| Pacific boiler | 0° | 0° |
| Warm blast No. 1 | 207.9° | 201.4° |
| Warm blast No. 2 | 213° | |
| Air warmed by abstractors: | | |
| Pacific boiler | 0° | 0° |
| Warm blast No. 1 | 303.7° | 315.5° |
| Warm blast No. 2 | 285° | |
| Temperature of steam, days: | | |
| Pacific boiler | 297.5° | 297.3° |
| Warm blast No. 1 | 361.1° | 322.6° |
| Warm blast No. 2 | 291.2° | |
| Difference of *t*, boiler and gases: | | |
| Pacific boiler, gases *above* | 70.8° | 79.6° |
| Warm blast No. 1, " *below* | 127.1° | 126.6° |
| Warm blast No. 2, " *below* | 127.2° | |
| Difference of *t*, boiler and air supply: | | |
| Pacific boiler, air *below* | 219.2° | 226.3° |
| Warm blast No. 1, " *above* | 21.6° | 26.9° |
| Warm blast No. 2, " *above* | 42.8° | |
| Pounds of flue gases per pound of coal, days: | | |
| Pacific boiler | 22.39 | 25.22 |
| Warm blast No. 1 | 23.49 | 28.37 |
| Warm blast No. 2 | 24.17 | |

| | Anthracite. | Bituminous. |
|---|---|---|
| Pounds of water equivalent in heat capacity to flue gases per pound of coal; sp. heat of gases = 0.238. | | |
| Pacific boiler | 5.33 | 6.00 |
| Warm blast No. 1 | 5.59 | 6.75 |
| Warm blast No. 2 | 5.75 | |
| British thermal units carried off in gases per pound of coal, days: | | |
| Pacific boiler | 1576 | 1835 |
| Warm blast No. 1 | 866 | 1092 |
| Warm blast No. 2 | 661 | |
| Efficiency *corrected* for difference in temperature of external air, and difference in time of banking fires: | | |
| Pacific boiler.....*per cent.* | 68.87 | 64.61 |
| Warm blast No. 1 | 78.18 | 77.59 |
| Warm blast No. 2 | 81.43 | |
| Difference of efficiency; pounds gained by warm blast, over Pacific boiler, cold blast: | | |
| Warm blast No. 1 | 9.31 | 12.98 |
| Warm blast No. 2 | 12.56 | |
| Ratio of gain to the larger quantity ($\frac{9}{78} \cdot \frac{31}{18} = 11.9\%$ etc.): | | |
| Warm blast No. 1.....*per cent.* | 11.9 | 16.7 |
| Warm blast No. 2 | 15.4 | |
| Ratio of gain to the smaller quantity ($\frac{9}{68} \cdot \frac{31}{87} = 13.5\%$ etc.): | | |
| Warm blast No. 1 | 13.5 | 20.1 |
| Warm blast No. 2 | 18.2 | |

The power consumed in driving the blower is about 1 per cent. of the whole power produced by the boiler in combination with a good steam engine.

It therefore appears that the net saving effected by the warm blast was from 10.7 to 15.5 per cent. of the fuel used with cold blast, which is the same thing as to say that discontinuing the warm blast would cause an increased consumption of fuel equal to from 12.3 to 18.9 per cent. of the quantity used with hot blast. Broadly stated, the gain is 10 to 18 per cent.

[Diagrams graphically representing results, and very complete drawings of apparatus used, were presented by the author.]

The Manchester Steam Users' Association (England) considers the bending test for boiler-plates as more rigorous than pulling or extension tests. The method is to take strips of the plates from six to nine inches in length by one inch wide, and heat them to a cherry red and plunge them in water at a temperature of about 80° Fah., after which they are bent double, the rule for good plates being that they must bend to a curve having one and one-half times the thickness of the strip, and it is expected that the bending will be accomplished without any sign of failure being visible. It deprecates the use of low grade irons, on account of the shortness and brittleness of their characters, making them unfit for use in boilers.—*Sanitary Engineer.*

## Robbins' Interlocking Brake Shoe.

The engraving shows the construction of this shoe so clearly as to render extended description unnecessary. It is extremely simple, requiring no bolts, pins or keys, being complete in itself as it comes from the foundry, without further fitting. It can be adapted to all patterns of brake beams and hangers, and is easily adjusted or changed.

It is not an untried device, but has been thoroughly tested by more than two years' service.

This brake shoe is being introduced by Wm. Woodcock, Elizabeth, N. J., master mechanic of the New Jersey Central Railroad.

## Iron and Steel Axles.

We take the following from the report of the doings of the Leicester Engineering Debating Society, as published in the *Railway Review* (English). The first paragraph is the conclusion of a paper read by the branch chairman:

"It seems to me that an iron axle must be safest, because it gives more notice of failure. I think hoops should be used, because they help to give strength. I would put hoops on new cranks *before* they begin to fail, and I think as cranks seem to fail after they have run a certain number of miles, that when they have done that mileage they ought to be taken out—at any rate out of passenger engines—as being no longer safe."

Several other speakers took part in the debate, and a large number of practical suggestions were brought forward and duly considered. The final result of the debate was that the majority of the committee was of opinion

(1) That iron axles are safer than steel axles.

(2) That all cranks should have the webs hooped.

(3) That as iron cranks appear to fail after running about 200,000 miles, and steel axles after 170,000, it is highly desirable that when they are known to have run these distances they should be taken out, carefully tested, and even if no flaw can be seen, they should not on any account be again used in passenger engines.

(4) That crank axles properly constructed are as strong as straight axles.

## McGraw's Adjustable Tube Expander.

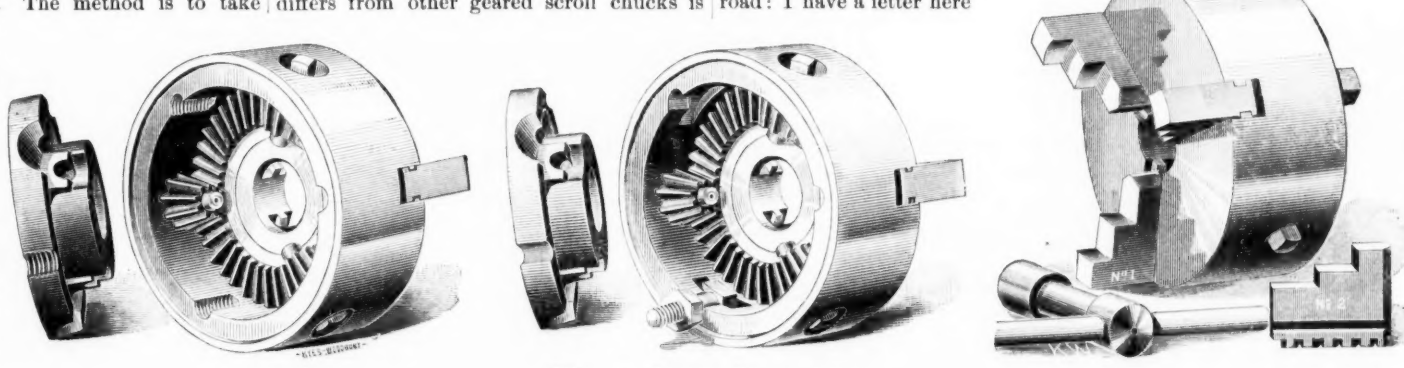
Four rollers are used in this expander, all the wear coming on the rollers and pin, the body acting simply as a guide to the rollers. The rollers are of large diameter, and from 3½" to 4" in length, providing good wearing qualities for pin and rollers.

One size tool will expand from two to four sizes of tubes. The tubes will be expanded as much inside as outside of sheet.

Manufactured by J. H. McGraw, Oswego, N. Y.

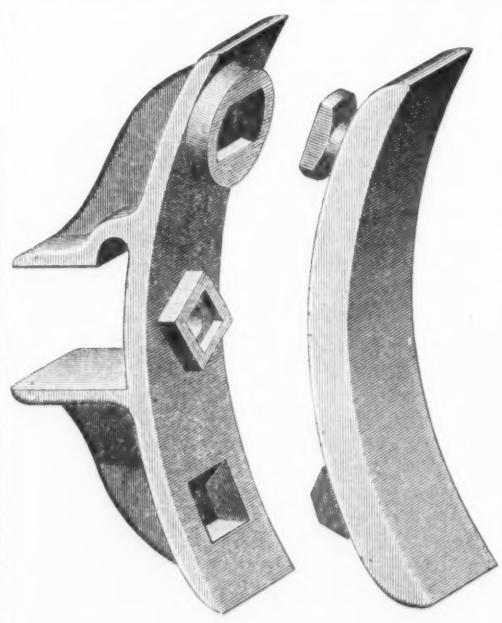
## Whiton's Geared Scroll Chuck.

One of the features in which this chuck differs from other geared scroll chucks is in making the shell carrying the scroll and jaws of one piece only, which piece is attached directly to the face plate. The pinions are inserted from the inside after the scroll is in place. They have taper bearings in the shell, so that they can be easily inserted and removed, and still mesh closely with the teeth of the scroll. In assembling, after the scroll and pinions are in place, a back plate is inserted, which closes the opening in shell and supports the rear end of pinions. The same bolts that hold this plate in place attach the chuck to the face plate.



WHITON'S GEARED SCROLL CHUCK.

The chuck appears to be strongly made, and has few attached parts. It is manufactured by D. E. Whiton, West Stafford, Conn.



ROBBINS' INTERLOCKING BRAKE SHOE.

## May Meeting of the Western Railway Club.

At the meeting of this club the question of balanced valves for locomotives was discussed. From the discussion we abstract as follows: Mr. Cooke, of the Chicago & Eastern Illinois Railroad, thought the subject deserved more thought than had been given it, either as regards repairs to machinery, saving of fuel or making the engine much better. He had one set of the Richardson balanced valve in use about two years, and the engine was giving very good results. The results were such that he should like to use more. He believed the valve gear was the end to begin at, and that instead of making a big valve and going to great expense to construct steam reversing gear, if they could get the pressure off the top of the valve, so a man could work it with a crippled hand, they would be able to draw three or four more cars with the same expense in fuel and repairs. If they could get something that would draw three or four more loaded cars it would pay for a set of balanced valves in about one day, and they would have the engine for 299 days in shape to draw the three or four extra cars. He thought the expense of the Richardson valve considerable. They paid ninety dollars for a set of valves.

Mr. Forsyth, C. B. & Q. road: I have a letter here from Mr. Richardson, in which he says that he will attend this meeting. If he is present we should be glad to hear from him.

Mr. Richardson, Troy, N. Y., did not know that as good results as those named by Mr. Cooke had been obtained on other roads, but believed, at the expense he (Mr. Cooke) named, the valves would save their cost in a very short time. He believed the expense attached to the manufacture of a balanced valve, making it as it should be made, of the best material and workmanship, was underestimated. Mr. Cooke neglected to state that he received with the balance valves a set of relief valves, the net cost of which is nearly ten dollars.

Mr. Cooke, in saying that they could draw two or three more cars, judged from the ease with which the engine works. He assumed that with so much friction removed there must be about that difference. He might have overestimated the difference.

Mr. Richardson mentioned an instance in the first use of these valves, when before applying, the engine drew 18 cars on a heavy grade; after applying the valves she took 19; he believed an engine did not slip as much with balanced valves as without. The reason for this was that the motion was maintained better. When the port begins to open with an unbalanced valve the down pressure being somewhat relieved by the pressure entering under the valve, it will have a tendency to jump open, causing the wheels to slip. The master mechanic of the Troy & Boston Railroad maintained that the wear of their tires was much less after balanced valves were put in than before.

In reply to a question from Mr. Cooke, Mr. Richardson said so far as he was concerned any one was at liberty to use the relief valves mentioned. This relief valve was now on about 3,000 locomotives, and he had never heard any complaints about it.

MCGRAW'S ADJUSTABLE TUBE EXPANDER.

Mr. Stevens, Lake Shore & Michigan Southern: How much of a load in pounds is removed from the locomotive by the balanced valve?

Mr. Richardson said that the space enclosed by the packing would be, on a locomotive with 16" or 17"×1¼" ports, about 90 square inches, which with a steam chest pressure of 100 pounds would amount to 9,000 pounds down pressure. He had made some experiments to determine how much this would take from the strain on the valve stem, but had not yet concluded his experiments. In one experiment he found that with the balanced valve it required about 325 lbs. to start it, and that under the same conditions it required 2,100 lbs. to start an unbalanced valve.

In reply to a question from President Verbryck, Mr. Stevens said he had had limited experience with balanced valves. They used both the Margo and Richardson balanced valve. Had them on about forty locomotives. They took a 17"×24" passenger engine and run her perhaps 2,000 miles with plain *D* valves, weighing coal, measuring the water, and keeping an accurate account of cars hauled. Then they did the same thing after the balances were put in, and the result of that test was that they made more miles per ton of coal, and evaporated more water per pound of coal, and the cost was less with the balanced valves than it was with the unbalanced. The saving in coal amounted to about five per cent. So far as they had got (in their experiments) they could run about 75 per cent. longer without facing the seats, with balanced valves.

Mr. Forsyth spoke of the saving of lubricant when balanced valves were used as important.

Mr. Johnson, C. B. & Q. railroad, thought the saving to the valve gear was often of as much importance as saving of fuel. Their engines equipped with this valve gear show little or no wear in valve gear after running 250 miles a day, for eight or nine months.

The subject for discussion at the next meeting is: "The best means of preventing the sliding of wheels with air-brakes."

The Pennsylvania Railroad Company, with the usual forethought that characterizes its management, has, in view of the possible appearance of the cholera this summer, issued circulars, with instruction to employes as to the means to be employed in keeping the property in their charge in the best sanitary condition. The company manufacture disinfecting fluid, and distribute freely. This action of the company is timely and commendable.

## Screw-Cutting on the Engine Lathe.

BY FRANK H. RICHARDS.

The V-thread being that which is most frequently and generally used, the cutting of it is naturally the first to be considered. To produce a good job, a most necessary thing is to see that the piece we propose to cut is turned to the right size. To have a neat and perfect thread, it must be turned small enough to just escape coming to a full thread, and the surface should be finished reasonably smooth. If not turned small enough, and if the screw requires to be cut still smaller after a full thread is attained, it is very sure to tear out and cut raggedly, and make a very bad looking screw. This is especially true of cast iron, where I have sometimes seen half of the thread torn off by trying to cut beyond a full thread. If it ever happen that a thread is cut to a sharp point, and yet is not small enough, the top of the thread should be filed off before continuing the cutting.

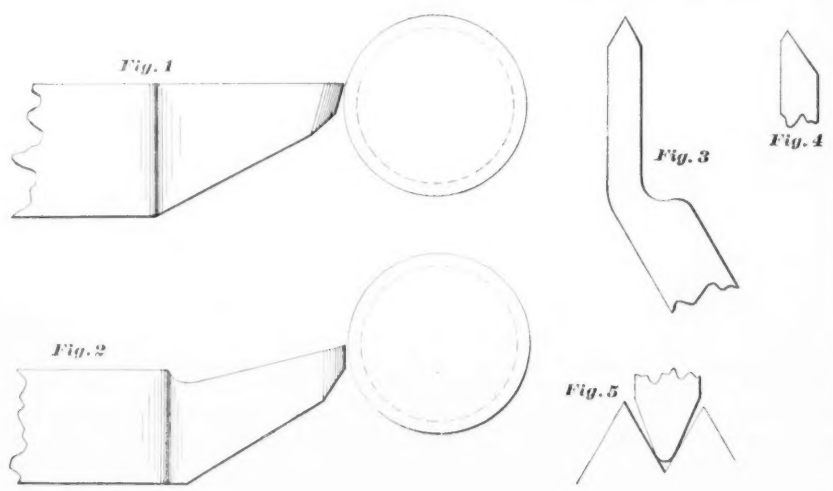
If the screw to be cut is to be made the size of some existing screw, a pair of calipers with very broad noses covering the points of two or more threads will be found a convenience in determining the outside diameter. The screw to be cut should be turned somewhat smaller than the size indicated by these calipers, as the points of the thread swell and rise somewhat under the pressure of the tool in cutting. If the screw is to be cut accurately to any required size, it cannot be done with any certainty by these calipers, as the least difference in the sharpness and perfection of the points of the thread will affect the result.

A V thread can be measured and cut to size more accurately by calipering the bottom or smaller diameter of the screw. The latheman should keep a pair of calipers for this purpose. The points of these calipers should be thin and V-shaped, somewhat more acute than the thread gauge, and the points should be ground off, so that they will never touch the bottom of the thread, Fig. 5. By the aid of such calipers, the expert workman should be able to cut a screw to the size of any sample screw with great nicety. It is not practicable to use the calipers with a knife edge, and to measure the bottom of the thread, as the least imperfection in the points of either the calipers or the screw would mislead us. And at their best, these calipers, on account of the pitch of the thread, do not represent its actual diameter, but only serve to compare it with the sample.

The difficulties in the way of a uniform and universal system of screw-threads seem practically insurmountable. The growing uniformity in the number of threads to the inch for any given size is to be rejoiced at as an approximation, but still we cannot state the actual size of any given screw in figures. We can state it, of course, just as we can state the length of a pendulum beating seconds in vacuo, and at the temperature of ice-cream, or the length of a degree of the earth's surface, and it will do us just about as much good. By the dissemination of the micrometer caliper, we are pretty well agreed as to how large an inch shall be, or any fraction of an inch; but no nicety of measurement will enable a man to cut a 1″ screw here that shall fit a 1″ nut a thousand miles away.

From the nature of its work, the V-thread tool is the most tried of all lathe tools, and to get it right and keep it right, so far as the wearing of it is concerned, is very difficult. If you have a new sample of tool steel that you want to try, there is no better test for it than in a thread tool. If it will stand satisfactorily for that purpose, it will be good for any lathe tool. A thread tool must not be too soft, or it will wear away fast, and when worn, it not only will not cut well, but the shape and correctness of the thread is immediately impaired. Upon the other hand, if the tool is too hard, the point will break, and cause great trouble in that way. The first cut over a screw is usually the most trying of all to the point of the tool, and it must not be crowded too much. It should be set so high as to leave scarcely no clearance in front of the point. This will secure to it the best possible support, and reduce the chance of breaking. At the same time, the top of the tool should be ground back to give the point as acute an angle as it will stand without breaking or dragging itself into the work. As a general thing, the sharper the tool is ground back on the top, the smoother will be the surface cut. Cutting metal and rubbing it off, are two distinct mechanical operations.

The latter method of removing metal is employed more frequently that it should be. If the tool is raised much above the center of the work to give it a better cut, it may be necessary to lower it by the screw at the back of the rest as the thread becomes deeper and the tool comes in nearer to the center. If the lathe rest has no elevating screw, or other arrangement for adjusting the height of the tool after it is fastened in the tool-post, then the front of the tool should be ground to stand nearly vertical and the point set level with the center of the screw to be cut, and to enable it to cut well and easily the top will require to be beveled back more than if the tool were higher and with more clearance in front. Many mechanics are subjects of a little illusion—optical or otherwise—regarding the setting




of a thread tool. Fig. 1 is about how I generally see a thread tool set. Fig. 2 would be condemned by half the mechanics I know, as far too rakish and piratical, and even positively dangerous. Yet the angle of the cutting face of the tool and the clearance in front of it are alike in both figures, while the advantage in other respects would seem to lie with the latter, as not requiring re-adjustment of height at different stages of the cut.

For general use in cutting threads, say up to 6, I would use a tool not much thicker than the required thread, and usually bent 30° to the right, Fig. 3. The bending of the tool gives it an offset, and makes more room for the rest in working up to a shoulder. There is generally but little trouble experienced from the springing of a thread tool, and for convenience of grinding and handling it is well to make it light. It is well enough to propose re-grinding a thread tool by grinding the top, and so avoiding the difficulty of adjusting the V to gauge every time; but in practice it does not work well. The difficulty of making the second side of the V to gauge correctly with the first side is really no greater than that of grinding the end of a square-nosed tool true. The sides of the V are always accessible on any flat-faced grindstone or emery wheel, while if we begin to grind a little curved notch in the top of a tool to give it cut, as some still advocate and too many still practice, we go but a little way in that direction before we encounter the impossible.

Where the thread is to be cut close up against a square shoulder, the tool should be ground away on the following side of the V until the leading side is left only just wide enough for the side of the thread to be cut, Fig. 4. Great care is required in cutting up close to a shoulder, as the tool must be withdrawn from the cut before the revolution of the screw entirely ceases. If we undertake to withdraw the tool from the cut after the lathe has stopped, we are very sure to break the tool, and not only have to re-grind it, but leave a piece of hard steel in the work upon which to repeatedly encounter similar shipwreck. In approaching a square shoulder with a thread tool, it is also well to see that no loose chips drop in between the shoulder and the advancing side of the tool. Where it can be permitted, and usually it can be, a groove should be cut in the work with a round-nosed tool, for the point of the thread tool to run into, when it can be withdrawn with perfect safety. A round-nosed tool is much preferable to a square-nosed for this purpose, and leaves the work neater and stronger.

Except in the case of cutting close up to a shoulder, when the lathe should be stopped and pulled carefully up to the stopping point by hand, and at the same time the tool withdrawn from the cut just before the motion of the lathe ceases, no such careful stoppage is required; the tool can usually be withdrawn with one hand while the lathe is stopped or reversed with the other.

The angle to which it is best to grind the tool on the top for smooth and easy cutting must be determined by circumstances. It will vary with different metals, and also with different men. I pick up a tool which I know will do very satisfactory work in iron or steel, and I find the angle between the top and front to be 70°. Another tool that does very well in brass I find to be about 90°. I have used a tool in cutting copper as acute as 60°.

The stop gauge for regulating the adjustment of the tool at each cut is a convenience that will be used less and less as the workman becomes more expert. The amount the tool is fed in at each successive cut can be gauged with sufficient accuracy by noting the position of the handle upon the cross-screw. The stop gauge, I think, should only be used for the finishing cut for the purpose of producing a number of screws of the same size, and then allowance must always be made for the wear of the tool.

Taps should be cut with all the care of which the workman is capable, both in size, in the shape and inclination of the thread, and in the smoothness of the finish. When nearly cut to the size, the tool should be reground and readjusted with great care, and the thread should be cut so smooth and bright as to require no polishing after. I have a notion that polishing spoils a tap. We were using in our shop the taps of perhaps the best and most eminent American firm in that line. They were perfect in size and admirable in finish. They were, in fact, too nice. I do not know how else to explain their fatal fault. They required so much power to drive them that we were obliged to abandon their use. I verily believe that some home-made taps, rough as the tool left them, and black from the forge, would tap a hole with one-quarter the power required by these fancy taps.

In cutting threads of wrought iron or steel, it is necessary to use some lubricating substance, and it must be confessed that for this purpose nothing is so good as oil. If the oil is not spread all over the screw, some spots being allowed to get dry, the result sought is worse than defeated. Pouring the oil upon the screw with an oil-can is an extravagant and wasteful way; while using much more oil, it is not spread evenly, and the bottom of the thread, where it is most needed, is often not oiled at all. Ninety-eight and one-quarter per cent. of the machinists do it in that way. A better way is to apply the oil with a stiff, short-haired brush, like a blacking brush, and use the worst oil that you can find. I am not of those who habitually sigh for "the good old days that are forever past and gone, and what we never won't see no more;" but, when I think of the genuine old whale oil that we used to have to cut screws with, there's where the sigh comes in, or rather out.

---

Those who have defended the privilege of importing (passage prepaid) foreign workmen, under the belief that it confers a great boon upon manufacturers in obtaining cheap labor, will do well to read the following extract from the New Haven *News*, which relates a bit of experience in importing foreign workmen:

About four years ago, Col. Frary, President of the Bridgeport Cutlery Company, while on a tour through Europe visited many of the cutlery establishments in Germany, Hamburg and England. The manufacture of razors being in a primitive state in this country, he decided that he could do no better than to bring over some of the workmen to the United States. The workmen in Sheffield, England, were, as a rule, members of the trades unions, and Col. Frary had considerable difficulty in engaging the men whom he wanted. A few months later he had the satisfaction of seeing forty of them with their families sail for this country, accompanied by the Secretary of the trades union. In Germany and Hamburg he engaged sixty men, and at once shipped them and their families to this country. Separate rooms were fitted up for the newly-arrived razor makers in the shops at Bridgeport, the Germans being in one part of the works and the English in the other.

Col. Frary said: "I had a great deal of trouble with my men at first. I did not have nearly as much trouble with the Germans as with the English. The latter demanded a separate work-room apart from all the other workmen in the factory. If one of the men in my employ wanted to enter the room while they were at work they would throw down their tools and would not resume their labors until the visitor had closed the door behind him. I was the only man in the entire shop whom they would let into the room without stopping work. A peculiar feature about them was that they would not work after 12 o'clock noon on Saturdays. Whatever money was left after buying the week's supply, the men would go on a spree with until the last cent was spent, which was usually about Tuesday morning. American workmen are the best in the world."

---

A correspondent of *Engineering* suggests instead of using thick plates for the circular shells of large boilers, that they be built up of thinner plates. Thus instead of 1½″ plates he would use four plates ⅜″ thick, or three ½″ plates.

---

### A Tough Country for Locomotive Engineers.

It is a great deal safer to run a locomotive in the United States than in Mexico. In the latter country some greaser is liable to go to sleep on the track and get crunched under the wheels of the engine. In such cases the engineer is locked up with a very poor prospect of being brought to trial and released. A recent dispatch from Eagle Pass, Texas, says:

"A passenger train on the Mexican International railroad ran over a sleeping track-walker Monday, and cut off his legs. On the arrival of the train at Monclova, conductor Bethel, engineer Eddings, agent James, a fireman and two brakemen were arrested. It is feared that they will have to spend the summer in the filthy jail, as it has been difficult before in previous instances to obtain any redress. Indeed, on two former occasions, the engineers after accidentally running over a man, cut loose from the train and never stopped their engines until American soil was reached, so well did they understand Mexican methods of justice. Those engineers never returned to Mexico. The American consul seems powerless to protect American citizens, as the local officials despise their authority, and disregard their protests."

## LETTERS FROM PRACTICAL MEN.

### The Grindstone Question.

*Editor American Machinist:*

I am getting a little exercised over the form the discussion of the grindstone question is taking. I know there are advocates of both ways of grinding—*i. e.*, the stone running to or from the grinder—and there must be some good *arguments* on both sides of the question.

I remember Chordal once said, "I have taken the grand trip," but those good old days are gone by, and we have to make the "grand trip" ourselves.

Well, I have taken the "grand trip" this time through the iron, coal and oil regions of Pennsylvania, and saw some things which made my eyes stick out; for, like the rest of us, I thought the Yankees were the only ones who knew anything.

I saw a grindstone rig in a little shop in Western Pennsylvania which I am going to describe, and also give the arguments which the foreman gave me in favor of it.

The rest is shown separate and attached to a stone. It is cut out of boiler plate with crow feet turned up, which are riveted to a base plate, which in turn is clamped to the frame.

The sketch will be understood without further description. It is made so as to clear the stone about $\frac{1}{4}$ inch on the sides, and may be $\frac{1}{4}$ or $\frac{3}{8}$ inch plate. This device is sketched as I found it, but the top of the frame might be pitched down toward the shaft, so the rig would fit better after the stone is worn smaller.

So much for the rest. Now for the argument:

The only good objection that has ever been offered to grinding on this side of the stone is the possibility of catching and grinding one's hands. The shield above this rest overcomes this objection; it also prevents water from spattering on the workman, and allows one to get around on the corner of the stone. This rest overcomes the principal objections to grinding on this side of the stone.

Let us now go over some of the good points of our side. The friction of the stone helps to hold the work down on a solid rest, making it much easier to hold a tool steady in the correct position. It compels the workman to grind over a firm rest, and keeps the stone *true* with very little turning, which is the main point.

I asked him if he had ever found any objection to this device. He answered: "No, I never found anything wrong with it, and the best thing I can say for it is that the men took to it kindly from the start."

This fellow told me something I had never thought of before, and that is that running clean water on the top of the stone and draining it off at the bottom is much better than using muddy water over and over again, and that at night the stone was not standing with the bottom in a puddle of water. Some sense in it—don't you think so?

JOHN COFFIN.

### Cutting a 32 Left-Hand Thread With 16 Right-Hand Dies—The Air Pump Question.

*Editor American Machinist:*

I notice in Mr. Hobart's article in the issue of May 23, what appears to me to be a very remarkable occurrence. He says that he found a 32 left-hand thread cut with a 16 right-hand die! I would like very much to know which way the machinist turned the die stock when he cut that left-hand thread. I can understand how, if the dies happen to be made just right for it, that a 32 right-hand thread can be cut by reversing one-half of the die, but this left-hand business gets away with me. If this thing is really a fact, and by taking a right-hand nut and turning it up side down you can get a left-hand nut, I would be very glad to know it.

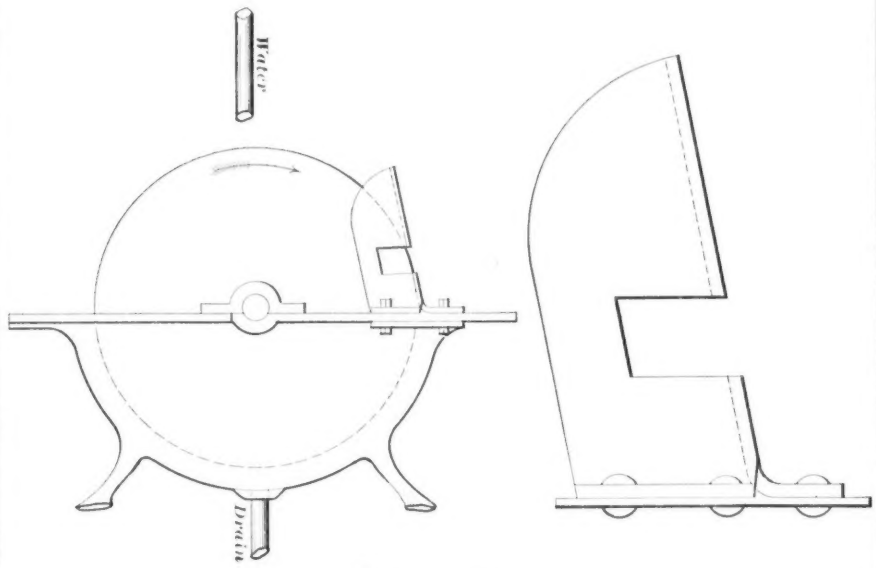
I notice also in your criticism of Mr. Beatty's statement that with steam pressure of 80 pounds he saw air compressed to 90 pounds which you say, in effect, it is impossible to do with the same diameter of cylinder. I think that if you will take the trouble to construct an ideal diagram of 80 pounds pressure, in which say 60 or 70 pounds are realized in the cylinder, with a cut off at about three-quarters stroke; and another one showing the compression of air from atmospheric pressure to 90 pounds, you will very readily see that the M.E.P. in the steam cylinder is greater than in the air cylinder, and that the thing is not only possible but entirely practicable.

C. L. REDFIELD.

### Wheel for Emery Cloth.

*Editor American Machinist:*

The advantages of using emery cloth on a wheel for certain kinds of work are too obvious to need argument around my shop; but a sketch in your last issue was the first intimation I ever had that such heresy had obtained a foothold elsewhere. About four years ago I made a wheel like the inclosed sketch, which has been in use ever since, and is the best thing we can get for some kinds of work. We get the emery cloth in rolls instead of sheets, tear it into lengths two inches longer than the circumference of the wheel, then into strips the width of the wheel face (in this case about two and one-half inches). To cover the wheel it is only necessary to fold one of these strips, placing its ends squarely together and securing them with the clamp *C*. The rim is sawed through at one point to admit the clamped ends of the emery cloth, after which it is drawn around the outside of wheel and all slack is taken up by the spring *D*. This spring keeps a constant tension on the cloth while the wheel is running, thus taking, as fast as it is made, any looseness that may occur.




GRINDSTONE RIG.

The uselessness of any wheel that does *not* do this is evident from the fact that a strip of ordinary emery cloth, three feet long, will stretch over an inch while being worn out. The following may be said in favor of such a wheel: It may be quickly renewed, and is *at once* ready for use without waiting for glue to dry. It has a true and level surface, which I think the boys will agree is not commonly the case with other polishing wheels.

As to the cost of "keeping up" such a wheel, it is more than where the emery is put on with glue, but it will do work that a less perfect wheel could not.

STERLING ELLIOTT.

### Don't Like Sand for Fitting Gears.

*Editor American Machinist:*

I like to read Brother Hobart's letters, and I hope he will continue to write more of them, but I don't want him to send "Bob Parker" to put on any gears in my mill until I can put all of the sand out of his reach.

Brother Hobart says "Bob used his brains, and got out of a bad scrape in good shape." I once had a little experience with sand myself, and I am afraid of it.

A little sand accidentally got between a wrought-iron brake strap and a cast-iron brake pulley, and was not noticed until it was discovered that the brake pulley was fast being reduced to powder and deposited on the floor.

WHEEL FOR EMERY CLOTH.

Investigation brought to light the fact that the sand had bedded itself in the wrought-iron strap, and was rapidly destroying the pulley. Brother Hobart neglected to tell us whether that gear ran perfectly true when in place, and whether that four feet of the shaft looked as smooth as the rest of its length.

It seems to me that, with the water wheel to revolve the shaft, a file ought to bring the shaft to size at a greater rate than six inches per hour.

VAGABOND.

### Formula for Determining the Strength of Steam Boilers.

*Editor American Machinist:*

Hasn't Mr. J. E. Jerrold got a new formula for determining the strength of steam boilers where he claims that a shell of steel 48″ diameter will stand 1,250 pounds, and, after further reductions, concludes that 312 pounds is actually safe? As near as one can judge from his figures, he takes no account of the diameter of the shell, except guess work.

The generally accepted formula is—

$$\frac{\text{Tensile strength} \times \text{thickness}}{\text{radius}} = \text{bursting strain}$$

and, according to U. S. inspection law, five becomes the factor of safety for double riveted seams, and a shell 48″ diameter and 70,000 tensile strength $\frac{25}{100}$″ thick becomes

$$\frac{70{,}000 \times .25}{24} = 729$$

pounds bursting strain, or

$$\frac{729}{5} = 145 \text{ pounds}$$

safe load.

W. E. CRANE.

Waterbury, Conn.

### A Steam Gauge that Froze Up.

*Editor American Machinist:*

In the issue of May 16th, you refer to the matter of steam gauges freezing.

I once had occasion to use a portable engine for running a pump while engaged in putting in a mason-work foundation. As the work was at the edge of a stream, and the foundation carried some 8 feet below the surface of the water, the boiler, rated at 5 horse-power, was run at near its limit.

The weather was extremely cold, it being in the month of December. Late in the day, the speed of the pump fell off. The man in charge of the engine declared, however, that he had 60 pounds of steam, as high as was considered safe to carry in this boiler. After looking at other parts, I looked in the furnace, and saw at once that the fire was not in condition to keep up the required pressure.

As it was already growing dark, I made no further effort, but allowed the fire to cool down. The gauge, however, still indicated 60 pounds, and the connecting pipe was found to be frozen. It has required no argument since then to convince me that a steam gauge may freeze while in use.

WILLIAM G. RICHARDS.

### Left Hand Threads with Right Hand Dies.

*Editor American Machinist:*

In an article in a recent issue of the AMERICAN MACHINIST, it was stated that a left-handed thread could be cut with a pair of right-handed dies, by getting one of the dies reversed in the stock so as to be out of line with the other.

Will the writer of that article be kind enough to inform your readers how he did that job?

Will he also tell us what distinction he makes between the pitch of a thread and the number of threads to the inch? He made none in speaking of a sixteen-to-the inch thread.

H. A. MAGOUN.

Bath, Maine.

### Forming a National Society of Draftsmen.

*Editor American Machinist:*

Mr. Butler's suggestion to form a society for draftsmen, if followed out, "will fill a long-felt want." An association of that kind could not fail to improve its members, and manufacturing establishments would reap part of the benefits. Chicago, as the place for the first meeting, would, I think, suit the South and Western men.

T. W. BEAL.

Sandwich, Ill.

*Editor American Machinist:*

In response to your request that you might hear the views of the draftsmen in general concerning the organization of a society in the interest of said craft, I will add my voice in favor thereof, and do my part in encouraging such a start. One question presents

itself to my mind, which Mr. Butler may have already anticipated—*i. e.*, where to draw the line between an expert draftsman and a mechanical engineer? Perhaps there are several members of the A. S. M. E. who are head draftsmen, or may be only holding secondary positions, while well deserving their title and place in the A. S. M. E. Does this scheme take in all such? So much the better if it does. I shall look with interest for the development of Mr. Butler's scheme, and such suggestions as the AMERICAN MACHINIST may make.

ANDREW C. CAMPBELL,
Draftsman of the Wheeler & Wilson Mfg. Co., Bridgeport, Conn.

*Editor American Machinist:*

As a "Knight of the T-square," I heartily concur with Mr. Butler to form a national association of draftsmen.

RALPH E. STATE.
C. H. & D. Ry., Lima (Ohio) shops.

### Locomotive Petticoat Pipes.

*Editor American Machinist:*

I noticed articles on petticoat, or lift pipes, in your issue of April 18 and May 16. I have used both kinds, making the flare on bottom to suit smoke-box so as to clean out sparks. The lift pipe is a very important part of a locomotive engine, and many an engineer and fireman have worried themselves almost to death trying to get over the road, and used language not fit for ears polite when the lift pipe had slipped down or fallen over, and they could not tell what had come over their pet until they looked into the smoke-box and there found the great (little) trouble.

Nothing relieves the working of an engine like opening the nozzles. This reduces back pressure on the piston, makes the engine work freer, throws less fire and uses less coal. But some one says, "We tried that, and got left on steam." Yes, so did I. Then I reduced the size of lift pipe instead of nozzles. I cut down some lift pipes from 12″ to 8″, leaving flare on bottom the same, putting a loose sleeve on top to slip up or down to suit draft on fire. Some I reduced from 13″ diameter to 9″ on 15″×22″ engine, and opened nozzles ¼″ or more, and made steam freer than before.

I know some firemen who pride themselves on having their engine always blowing off, or "the cotton tail out," as our boys say. That is not a good recommendation on our road; to just keep it ready to pop out is better.

Mr. Stevens don't give size of cylinder on which he uses 13″ lift pipe; but if he would reduce it to 10″, leaving flare on bottom the same, and straight pipe 8″ or 10″ longer, or with loose sleeve on top, I think he could open the nozzles, and his engines would work far easier on heavy or fast trains. Let any master mechanic try this plan on one engine—it won't cost much—and report. I think the results will be favorable to small blast pipes.

JOHN J. BINGLEY,
M. M. of H. J. H. and G. R. R.,
Hanover, Pa.

### Melting Treasury Steel Plates and Dies to Destroy Them.

*Editor American Machinist:*

From discussions in your journal regarding the melting of steel in ordinary cupolas, I perceive it is considered a novel feat even by experienced foundrymen. The fact is, it has been successfully practiced in the foundry of the Steam Engineering Department, Washington Navy Yard, for the past twelve or fifteen years.

In the Bureau of Engraving and Printing of the U. S. Treasury, large quantities of steel accumulate, resulting from worn-out and defective dies, plates, transfer rolls, etc., used in printing the various denominations of notes, bonds, revenue stamps, etc., of the Government. These accumulations are further augmented by the plates captured from counterfeiters, which sometimes are no small amount. From time to time a committee is appointed by the Secretary of the Treasury to supervise the destruction of those useless plates. The committee first require all pieces to be identified, classified and recorded. They are then packed into boxes containing from one hundred to one hundred and fifty pounds. The boxes are then securely bound and sealed, and placed in the vaults to await their finality as regards their present form. Their final destruction is accomplished in an ordinary forty-inch cupola. The only necessary precautions are a more careful lining and a heavier bed of sand in the cupola.

In their transit to the Navy Yard, and until the contents of the boxes are thrown into the cupola, the committee never allow the boxes to get out of their sight. A portion of the committee are stationed on the platform, while another is on the floor guarding the boxes, and waiting for the metal to come down. When the bottom of the cupola is dropped and the residue cooled, it is carefully searched to see that no undestroyed piece remains. The duty of the committee in all its details is assiduously performed. In charging the cupola, heavier charges of fuel (which is anthracite coal) are used than would be with iron. The boxes are broken open on the platform, and their contents, with a small quantity of scrap cast-iron, are thrown into the cupola. The iron is employed chiefly to prevent the plates from packing too close. As the absolute destruction of the plates, as such, is the object sought, no effort is made to utilize the metal, which runs from the cupola very fluid, and is run into pigs. But the committee-men, anxious to preserve some memento of their labors, which sometimes extends through several months, have cast of the metal small articles, such as paper weights, etc. No difficulty is experienced in obtaining good castings, but they are generally too hard to work without annealing.

The first efforts to destroy the plates were only partly successful, owing to the boxes, with their contents closely packed (resembling a solid mass) being thrown into the cupola. Every foundryman knows the difference between melting a hundred pounds of metal in one piece and the same quantity in small fragments. The experience acquired with the melting of these plates is about the same as that with any other refractory metal. It should be uniformly distributed, and not be too closely packed in the cupola. The metal will then come down in the shortest time, which is a great desideratum in all processes where the melting is exposed to the atmosphere, as the loss by vaporization is reduced with the time required to melt. J. MCKIM CHACE.

### Locomotive Air Pump Question.

*Editor American Machinist:*

In your issue of May 23 you published a letter from Mr. D. Beatty, in which he gave expression to facts and data within his knowledge affirmative to Mr. C. Beach's question, "Is it possible for a locomotive air pump, with steam and air cylinder of the same diameters, to compress air to higher tension than that of the steam which drives the pump?" Mr. Beatty, however, did not venture a reason *why*, to fortify his fact.

I was surprised to note your appended remarks of negation, and mentally deplored the inadvertence that allowed you to use the analogy of the beam balance with which you pointed your denial, because, in my opinion, it is in this case decidedly malapropos, and is withal a specious fallacy, inasmuch as it entirely ignores the *vis viva*, or living force of the moving parts, which is the vital element of this problem.

Tersely, the conditions of the problem are: A direct-acting steam air pump; air and steam ends of same diameters; steam admitted at nearly full pressure; air admitted at atmospheric pressure; moving parts *have weight*.

Action, ignoring friction: Steam is admitted (wiredrawn, if you choose); starts piston with no load. Resistance increases slowly, while piston gains high velocity (comparative), resistance being at half stroke only 15 lbs. (Mariotte's law: Pressure increases inversely as volume diminishes. Volume ½, pressure ²⁄₁ = 30 lbs. — 15 lbs. = 15 lbs.) From this point of the stroke, therefore, the pressure rapidly increases proportionately, but the piston speed is not materially diminished when the balancing pressure is reached, because to the impetus received during the early part of the stroke there is a constant though rapidly diminishing impulse to the point of balance. (Law of Mariotte: Body once set in motion continues that motion until acted upon by some external force. And: A body will always move when the propelling force is greater than the resultant of all resistances.)

Now, as it is plain that the piston is still in motion when it reaches the balancing pressure, the question is prompted: Can the piston be stopped instantly? No need to argue that question; the merest tyro in mechanical matters would negative it, and the negative would lead to: Then *what* is the result of its continued motion? Tyro would again say: "Why, if you push *that* thing any further into that hole, it will squeeze the wind that's in there more." "That's easy enough." Tyro having settled that part so easily, Mariotte's law steps in and says: If you squeeze wind it will get harder, and will kick back more. Tyro says: Which has to be proven.

Now, Mr. Editor, I must in candor admit that, though this increase of pressure is eminently possible, and the conditions to give the result easily obtained, yet I venture to say the result is rarely attained in practice, and obviously, because the elements of malalignment, improper packing, and all the possible mechanical conditions favorable to excessive friction, with the addenda of leakage and loss of heat from the compressed air are sufficient in most instances to neutralize the striking force of the piston.

Apropos to this subject, and to your analogy of the beam balance, I submit an experiment which any of your investigating readers may make, and which is a true analogy of this problem, varying only in degree and substitution. Take a spring balance with pan attachment. Hold a weight in contact with the pan, but without pressure, and suddenly release the weight. Note the point to which the index goes; note its position of rest. The difference indicated is of the same nature, but changed in degree, that we ought to expect in an air pump.

BENJ. ADRIANCE.
Brooklyn, N. Y.

### Marking Patterns.

BY ROBERT E. MASTERS.

This subject of "marking patterns," and keeping account of the number of castings made and required to be made to fill an order, is one that has occasioned much annoyance in foundries, and often causes trouble between moulders and foremen and the firm employing them. More castings are often made than are necessary to complete an order, and often, when ready to ship for use, the number of pieces is short. Unless based on a *system*, as all branches of foundry practice should be, it is a hard matter to place the responsibility where it should be for over-production or shortage, especially in a foundry where they depend altogether on marking the patterns with chalk.

A foreman ought to hesitate a long time before reprimanding a moulder for not "coming up to the mark," and turning out the exact number of pieces, where he is provided with no other means to keep account of the number to be made than the chalk mark on his pattern, which could be very easily rubbed off by himself or others in handling the pattern, and for that and various causes be forgotten. The foreman ought to feel that he has not "come up to the mark" himself, and has been remiss in that portion of his foundry management; that it was his business to provide means to keep correct accounts, and see that the right number of castings were produced, and then, in a case of shortcoming, that he deserves his share of the blame.

There are a number of methods by which a very correct score can be kept, but one of the most complete systems of which the writer has any knowledge is practiced in a large foundry employing over one hundred moulders, and melting, on an average, fifty tons of iron per day into light and heavy castings. I am at liberty to describe the system.

If a moulder works from only one or two patterns, and there are a number to make off each pattern, or if it is a moulder on a jobbing floor who only makes one piece off each pattern, when they receive their pattern they find a printed blank tacked on it, with the number required, name of pattern, and date of order written thereon. The blank must be filled out by the moulder, and tacked on the pattern, and returned with it when the number is completed. To illustrate an order as given, the portion in italics will indicate that which is written:

| | |
|---|---|
| Date of order..... | *May 1st*, 1885. |
| Name of pattern.... | 16-*foot pivot.* |
| Number to make..... | 4 |
| Number made ..... | |
| Number lost..... | |
| Weight..... | |
| Made by..... | |
| | Moulder. |

If the moulder makes one casting each day, he marks the figure 1 on the line to indicate the number made; the next day the figure 2, the last figure always indicating the sum total of the number made. If, on coming into the shop some morning, and after looking carefully for something he don't want to find, he discovers to his surprise that he has "lost one," for which most anybody and most everything, *except himself*, is responsible, to hear the average moulder tell it, he must place the figure 1 on the line for lost castings, just the same as if no one but himself was responsible. It's hard, I know. "I've been there." The excuses can't go down—there would not be room on the whole pattern for them — but the figures must be put down in the place designed for them, no matter how large the order. At any time, by subtracting the lost castings from the last figure of castings made, and that product from number ordered, we have the number required.

If for any cause the moulder on this pivot job is absent, and the work is in a hurry, that card is taken up, the good and bad castings charged to him, and a new card issued for the number still required to the moulder who takes his place. The following will show the style of the blank after it has been filled out.

| | |
|---|---|
| Date of order..... | *May 1st*, 1885. |
| Name of pattern.... | 16-*foot pivot.* |
| Number to make..... | 4 |
| Number made ..... | 1, 2, 3, 4, 5 |
| Number lost..... | 1 |
| Weight..... | 725 *pounds.* |
| Made by.... | JAMES MATHEWS, |
| | Moulder. |

In case a moulder has a number of small pieces of different kinds to make, a written order is given him, leaving a line or two blank between each item for him to keep account of castings made. In both cases the foreman keeps an account book for this purpose, with a copy of all orders on the plan of the last mentioned, and each day when the castings are cleaned he registers the amount of each kind which are given to him by some one he may appoint in the cleaning room, in case he does not have time to attend to it himself. When there is a variety of work, it is no trouble for him to classify it in his account book. For example: He can place an order under the head of

RAILROAD CAR CASTINGS.

100 Diamond oil boxes,
12, 23, 35.
75 Buffer bumpers,
16, 32, 50.

It will be seen at a glance that it takes 65 oil boxes and 25 bumpers to fill that order. At the time an order is placed, similar orders to those given the moulder are given to the core maker, in case cores are required, due notice being given each day to moulder and

core maker of castings lost, so they can keep correct account.

The latter plan can be practiced in any shop. On giving a moulder an order for a pulley to be drawn up and made from a band, we always give a written order with the pattern. For instance:

Make 1 pulley, 48″ diameter,
13½ face, 2¼ core.

If he is at all attentive he cannot make a mistake, and has no excuse for forgetting. For open sand work, or work to be struck up without patterns, we furnish tracings. In some future issue I will give an account for marking patterns for a different purpose than making the correct number of pieces, which is equally as important as the above subject.

## New Dean Steam Pumps.

The two engravings on this page represent new styles of steam pumps lately brought out by the Dean Bros. Steam Pump Works, Indianapolis, Ind.

The boiler feed pump shown is from entirely new designs. Its main features are strength, positiveness and noiseless action. The steam-valve motion is continuous. No tappets are used in the valve gear, and there is no pause in the motion of the auxiliary valve, except at the moment the main piston is reversing its motion, the result being a smooth, noiseless action. The pump piston is packed with brass expanding rings. Valves are of brass, with flat faces. It will take water from a heater, and deliver it into a boiler at a temperature of 212°.

The vertical pump is for pumping from deep wells or mines. The steam cylinder is placed on the floor above the well or shaft, so that it is unnecessary to go below to start the pump or lubricate the parts. The pump is double-acting, and therefore throws a continuous stream. It is fastened to cross timbers in the well, and is connected with the frame of the steam cylinder by two vertical rods. The manufacturers say it works perfectly, even when the pump is placed 100 feet below the steam cylinder, and that it will work without shock or jar, as the amount of steam for downward or upward stroke can be governed by the engineer. There being adjustable valves at both ends of the steam cylinder, a uniform motion is produced without regard to the weight of the reciprocating parts.

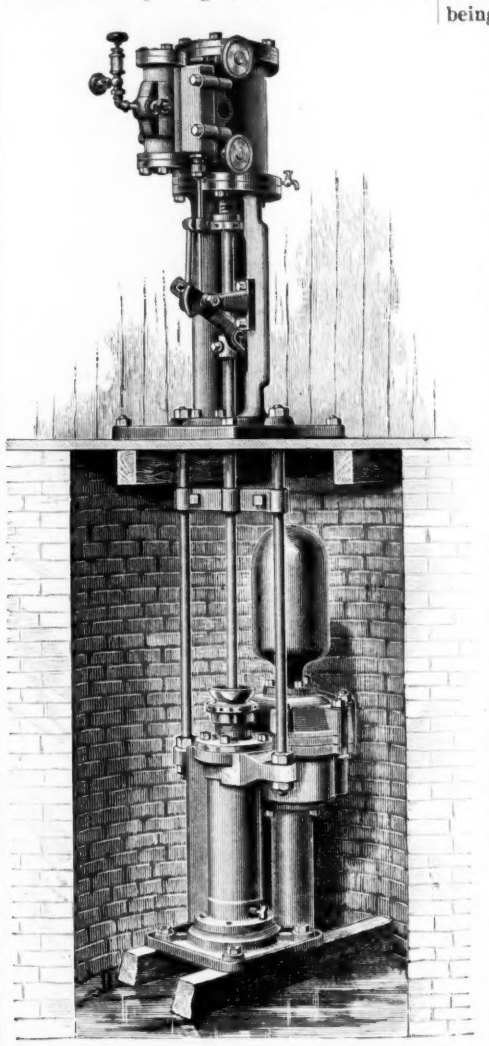
The dimensions of these pumps depend on the height the water has to be forced, and other varying conditions.

## Railroad Shop Notes.

BY FRANK C. SMITH.

James Meehan, Gen. M. M. Cin., N. O. & T. P. R. R., has in use an arrangement which is at once novel and promises better economy. His roundhouse is piped with a system of piping arranged to connect with the boiler of any engine standing in the roundhouse, and also with one or two or more others. When an engine comes into the house with steam on, she is at once connected to this system of piping, as are also any other engines which are being fired up. Thus the cold water in the boilers of the engines being fired up is heated by the steam from the boilers of the engines coming in under steam. The blower pipe of the engines being fired up can also be connected with the steam pipe system, so that the fires in the engines being fired up may be urged if desired. On a road where from 50 to 75 engines are handled daily in and out of the roundhouse, the great economy and celerity which results from this plan cannot be appreciated until tried, for as soon as a hot engine comes into the house, the steam, in place of being blown off by the safety valve, is at once connected with the piping spoken of, and other engines being fired up being also connected with the same piping are very rapidly got ready to go out.

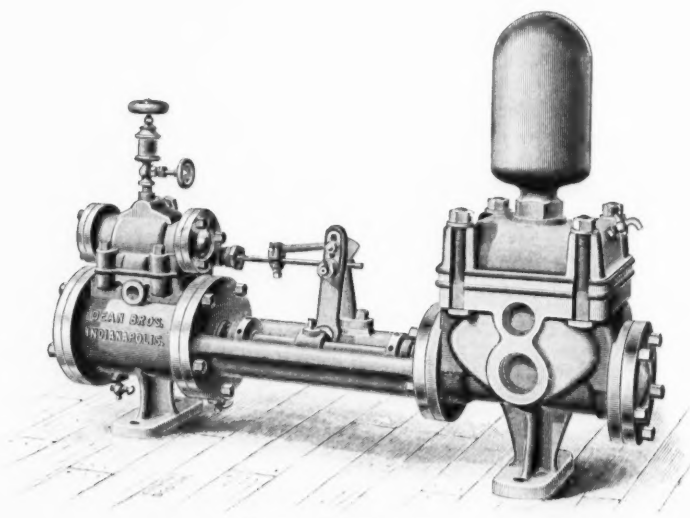
Mr. Meehan, some time since, placed a large steam hammer in his blacksmith shop, and found that in four months it had paid for itself. A heating furnace is also provided, and all of the road's scrap is assorted and the best reserved, fagotted and forged into car axles, locomotive axles, locomotive frames, etc., etc. The economy is shown by the fact that car axles, which can be dropped on with a heavy weight, bent double cold,



VERTICAL DEEP WELL PUMP.

straightened and bent again without fracture, cost from his hammer less than $1.60 per hundredweight. To purchase axles which would stand the drop test would cost about $2.15. It is unquestionably economy on roads of any size to work up the best scrap by means of heating furnace, as in the matter of locomotive frames, to say nothing of axles, etc., they are produced for from four to five cents less per pound than they can be purchased for.

Solid ends on the back end of main rods, with solid backing, are objected to on account of the lack of any means of taking up lost motion. I saw an 18x24 passenger engine with this style of rod on Mr. Meehan's road, which had made 100,000 miles with the original bushing, and there was not lost motion enough in it then to make a perceptible thump at full stroke.




BOILER FEED PUMP.

There is some talk of a new glass factory being started in Baltimore by the glass blowers on the co-operative plan. About $12,000 capital is expected.

## Atlantic City Meeting of the Mechanical Engineers.

The American Society of Mechanical Engineers had an interesting meeting at Atlantic City, N. J., last week, the weather being delightful, but the attendance rather slim. Mayor Maxwell welcomed the members the first evening (Tuesday) in a pleasant address in which he expressed the hope that the meeting would have some influence in bringing about an improved sanitary condition of the city. President Holloway in responding said the selection of such a place for meeting was a new departure for the society, which had been used to gathering among smoking chimneys and roaring steam pipes, and after stumbling over piles of pig iron and rails, and getting tired, the members thought they had been having a picnic.

Part of the sessions were devoted to the free discussion of questions presented by a sort of conundrum committee. This proved fully as profitable as the reading and discussion of set papers.

Are welded boilers and flues stronger than those riveted? was asked. The members had had hardly any experience themselves. J. B. Root had welded short lengths in gas jets with satisfaction. He had found that some kinds of steel low in carbon welded better than iron. The heat seemed to injure the steel less than iron. Prof. Sweet said the tanks of the Westinghouse air brake used under cars were welded by rolling—a nice operation.

Mr. G. H. Babcock while traveling in England last year found that Sterne & Co. welded 36″ boiler shells with a machine by one operation, except in boilers six feet long, when they were welded together half the length at a time. The boilers were said to be of extra strength. A boiler maker in Oldham told him they welded all their shells better and cheaper than riveting. In Jersey City recently some 12″ flues 18 feet long had been welded with the purpose of sustaining a tensile strength of 2,000 lbs. per square inch. Half of the tubes gave out at less than half the required pressure.

President Holloway called attention to the fact that on Mississippi river steamboats they prefer to make internal boiler tubes of short sheets, so as to get greater stiffness, the result of experience.

Mr. Babcock said flues would be stiffer if fitted with external rings, or corrugated, as, for instance, the Fox corrugated flues, so much used on marine boilers, but in boiler shells it would be a weakness.

Mr. Root said Rowland, of Greenpoint, is welding torpedoes with machinery; also welding tubes, and corrugating them afterwards. He has a machine (as has been mentioned in these columns) for welding, built for his use. He uses water gas for heating the weld.

The report of the committee on "A Standard Method of Conducting Boiler Tests," which substantially recommends the adaption of the Centennial unit of power—the evaporation of 30 lbs. of water from feed water of 100° temperature and at 70 lbs. pressure—was discussed for over three hours, and it was finally decided not to take any action upon its adoption.

The following papers were presented in addition to the list as stated in our May 30th issue:

"Steam Generator for the Heating of Dwellings"—John W. Anderson.

"The Polar Planimeter"—Charles E. Emery.

Over $550 were subscribed towards the fund for a library.

The following persons were admitted to membership, being fifty-four new names in all:

Members—Robert W. Aitkin, W. H. Alderdice, Daniel Ashworth, Phinehas Barnes, J. N. Barr, Norman C. Bassett, Hugo Bilgram, Henry W. Bulkley, Frank M. Clark, W. J. Creelman, Jas. A. Crouthers, Jas. G. Dagron, Isaac H. Davis, J. C. Debes, J. J. De Kinder, Wm. H. Doane, Edgar C. Felton, A. O. Frick, Frank L. Griswold, Jas. T. Halsey, Geo. Hayes, Alex. Henderson, Ludwig Herman, Elliot Holbrook, Charles E. Hyde, Wm. H. Inslee, A. H. Jacobi, John Jenkins, O. W. Kelly, J. P. S. Lawrance, Chas. W. Livermore, Ferdinand Martens, M. R. Muckle, Geo. H. Perkins, Ferdinand Philips, Chas. Potter, Jr., Edwd. P. Roberts, J. M. Robinson, W. N. Rumely, Adolph Schleicher, C. A. Smith, John N. Sweeney, John H. Webster, J. Leland Wells.

Juniors—Chas. S. Beach, Ernest H. Foster, W. J. P. Moore, H. DeB. Parsons, C. E. Rommel, Frank A. Scott, K. Torrance, H. Van Duzer, Chas. W. Whiting.

Promotion to Membership—Saml. Higgins, Jr., A. S. M. E.

Associate—B. F. Emerson.

## Boiler Explosions During 1884.

The Hartford (Conn.) Boiler Inspection and Insurance Company have published a summary and classified list of boiler explosions for 1884, with a list of the people killed and injured thereby. During the year 152 boiler explosions occurred in the United States, by which 254 people were killed and 261 others injured, many of them fatally. Of these explosions, 56 occurred in saw mills and wood-working shops, 15 in locomotives, 15 in steamboats and tugs, and 18 in portables, hoisters and agricultural engines, while 7 occurred in mines, oil wells and collieries, 5 in rolling mills and iron works, 9 in flour mills and elevators, and 8 in distilleries, breweries, sugar-houses, dye-houses and rendering establishments. The saw-mill boiler heads the explosion list, as usual, though there is a falling off from the previous year. Marine boiler casualties were exactly the same in number as in 1883. The total number of explosions during 1884 is less than in 1883, but this result is attributed to no cause more flattering than the prevailing business depression.

Out of 1,586,453 net tons of anthracite pig iron, made in this country during 1884, fully five-sixths were made by the admixture of coke with anthracite coal, and the tendency towards such admixture is so strong that it is thought few blast furnaces will long continue to use anthracite alone. The average quantity of coke used in anthracite furnaces is a little more than one-third of the quantity of anthracite.

Gold mining is attracting more and more attention everywhere throughout the civilized world. The production of gold is decreasing and the amount required is constantly increasing. The consequence is that the purchasing power of gold is increasing every year. Gold mining is almost the only industry whose product is more valuable the "harder" the times and the less it costs to produce.—*Engineering and Mining Journal.*

Industrial enterprises cannot be started without capital, and by uniting their means and their efforts workmen can enter into competition as producers, which most of them would never be able to do singly.

AMERICAN MACHINIST

PUBLISHED WEEKLY

BY

**American Machinist Publishing Co.**

HORACE B. MILLER, Pres't.
JACKSON BAILEY, Vice-Pres't.
LYCURGUS B. MOORE, Treas. and Sec'y.

**96 Fulton Street, New York.**

JACKSON BAILEY, Editor. HORACE B. MILLER, Business Manager.

F. F. HEMENWAY, - - Mechanical Engineer.

**The American News Company,**

Publishers' Agents, New York.

**The International News Company,**

11 BOUVERIE STREET (Fleet Street), LONDON, ENG., will receive subscriptions for the AMERICAN MACHINIST, at 14/7 per annum, postage paid.

DEALERS SUPPLIED BY

The American News Company, New York.
The American News Company, Denver, Col.
The American News Company, Kansas City, Mo.
The American News Company, Omaha, Neb.
The American News Company, St. Paul, Minn.
The New York News Company, New York.
The National News Company, New York.
The New England News Company, Boston, Mass.
The Central News Company, Philadelphia, Pa.
The Western News Company, Chicago, Ill.
The St Louis News Company, St. Louis, Mo.
The Cincinnati News Company, Cincinnati, O.
The Detroit News Company, Detroit, Mich.
The Pittsburgh News Company, Pittsburgh, Pa.
The Baltimore News Company, Baltimore, Md.
The Rhode Island News Company, Providence, R.I.
The San Francisco News Co., San Francisco, Cal.
The Brooklyn News Company, Brooklyn, N. Y.
The Williamsburg News Co., Brooklyn, E. D., N. Y.
The Newark News Company, Newark, N. J.
The Northern News Company, Troy, N. Y.
The Albany News Company, Albany, N. Y.
The Washington News Company, Washington, D.C.
The New Orleans News Company, New Orleans, La.
The Montreal News Company, Montreal, Canada.
The Toronto News Co., Toronto, Ontario, Canada.
The Toronto News Co., Clifton Branch, Clifton, Ontario, Canada.

*SUBSCRIPTION.*

$2.50 a year in advance, postage prepaid in the United States and Canada.

$3.50 a year to Foreign Countries, postage prepaid, except Bolivia and South Africa, to which the subscription rate is $4.50 a year, postage prepaid.

*ADVERTISING.*

Transient, 35c. per line, each insertion.
"Business Specials," 50c. a line.

*EDITORIAL ANNOUNCEMENTS.*

☞ *Positively we will neither publish anything in our reading columns for pay or in consideration of advertising patronage. Those who wish to recommend their wares to our readers can do so as fully as they choose in our advertising columns, but our editorial opinions are not for sale. We give no premiums to secure either subscribers or advertisers.*

☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery, nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen, and all those especially interested in the occupations we represent, on subjects pertaining to machinery.*

☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, JUNE 13, 1885.

CONTENTS.

| | PAGE |
|---|---|
| New 30-Inch Drill Press | 1 |
| New Design of Pulley Lathe | 2 |
| Report of Trials of Warm Blast Apparatus. By J. C. Hoadley | 2 |
| Robbins' Interlocking Brake Shoe | 3 |
| Iron and Steel Axles | 3 |
| McGraw's Adjustable Tube Expander | 3 |
| Whiton's Geared Scroll Chuck | 3 |
| May Meeting of the Western Railway Club | 3 |
| Screw-Cutting on the Engine Lathe. By Frank H. Richards | 4 |
| A Tough Country for Locomotive Engineers | 4 |
| Letters from Practical Men—The Grindstone Question—Cutting a 32 Left-hand Thread with 16 Right-hand Dies—The Air Pump Question—Wheel for Emery Cloth—Don't Like Sand for Fitting Gears—Formula for Determining the Strength of Steam Boilers—A Steam Gauge that Froze Up—Left-hand Threads with Right-hand Dies—Forming a National Society of Draftsmen—Locomotive Petticoat Pipes—Melting Treasury Steel Plates to Destroy Them—Locomotive Air Pump Question | 5, 9 |
| Marking Patterns. By Robert E. Masters | 6 |
| New Dean Steam Pumps | 7 |
| Railroad Shop Notes. By Frank C. Smith | 7 |
| Atlantic City Meeting of the Mechanical Engineers | 7 |
| Boiler Explosions During 1884 | 7 |
| Superabundance of Industrial Exhibitions | 8 |
| Annual Report of the Iron and Steel Association | 8 |
| Accidents from Machinery | 8 |
| Literary Notes | 9 |
| Questions and Answers | 9 |
| Business Specials | 9 |
| Manufactures | 9 |
| Machinists' Supplies and Iron | 10 |

## Superabundance of Industrial Exhibitions.

Public ardor for industrial exhibitions began to flag a year or two ago, but the promoters and managers did not relax their energies, and pretended that their fairs were so much better supplied with attractions than ever before, that nobody desiring to keep up with industrial progress could afford to neglect them. The fact is there has been an over-production of exhibitions, both general and special, and the result is unfavorable in many cases, both to their projectors and to the exhibitors. It costs largely to prepare an exhibition on a scale sufficiently large to attract crowds of visitors, and it incurs no mean expense to every exhibitor of machinery or mechanical appliances who endeavors to present his productions in a favorable way.

If exhibitions are not too numerous they are likely to prove profitable to exhibitors, but when there is no longer any novelty in the articles displayed, it is best to wait two or three years before starting up another fair of the same kind in the same city. The only exception we have noticed is the American Institute Fair held annually in this city, where, with the attractions of a good band, and numerous ice cream and confectionery stands, the same articles may be shown year after year to undiminished crowds of visitors.

Specially prepared exhibits, shown at the Centennial in 1876, are getting familiar to the public by making their appearance at fairs every year since then.

The Novelties Exhibition, to be held by the Franklin Institute in Philadelphia next fall, ought to begin a new era of displays, and signalize the withdrawal of objects that have done duty at expositions throughout the last decade.

There is usually but little profit to the projectors and stockholders of great exhibitions. Lately, however, it is only a matter of how small the loss may be ciphered down.

The recent failure of the New England Manufacturers and Mechanics' Institute, which at first made their exhibitions pay a profit, indicates the tendency of regular enterprises of that character. Scarcely anybody expected the World's Fair at New Orleans to be profitable in itself, but the deficiency in receipts as compared with expenses is greater than was anticipated. It was not attended with anything near the throngs of people that were expected from the North and from abroad. In many respects it proved a disappointment.

An International Inventors' Exhibition, and an "American Exhibition," to be held in London, now claim attention, but it does not yet appear that many noteworthy mechanical articles are to be sent from this country for display.

It would be wise for the managers of the six or eight prominent exhibitions held nearly every year in different parts of the country, to hold a convention and bring about an agreement to consolidate their efforts, and hold not more than one large exhibition in the East, and one in the West every fall, varying the locality so as to benefit every city where such exhibitions have heretofore been conducted. Exhibitors, who display goods worth traveling a distance to examine, would welcome such an arrangement, and business men who have been called upon to make up deficiencies in the finances of local exhibitions, would also favor the plan.

In order to make exhibitions accomplish the objects for which they are projected, a reduction in the number of them is necessary.

---

The machine shop practice of the present, however it may be for the proprietor, is not the best for the boys. A boy who determines to follow working in the machine shop should make a strong effort to learn the trade, instead of taking a job at some particular branch of it, and following it year after year, never becoming in any sense of the word a mechanic. By giving attention to tending some special tool in the shop a boy will, for the first few years, make better wages, but in the end his wages will be smaller and he will have less self respect and receive less consideration than if he were a machinist. Besides his prospects of finding work when a change is necessary or desirable are much less. It is altogether better to sacrifice something in the beginning for better prospects further on. The independence of the man who is looking for a job at anything ordinarily done in a machine shop, as compared with that of the man who is after a job drilling holes, for instance, is worth a good deal. A boy ought to make up his mind that he will learn the trade if it is necessary to work in a dozen shops to do it.

## Annual Report of the Iron and Steel Association.

The Secretary of the American Iron and Steel Association, Philadelphia, has issued his annual report containing statistics of the American iron trade for 1884, together with a review of the present condition of the iron industry in foreign countries. The report says the year 1884 was a critical one for American manufacturers, as with the exception of a brief period early in the year, the demand for iron and steel steadily decreased, while there was an increase of competition among manufacturers naturally resulting in labor troubles. As a consequence, the winter of 1884–5 was a most unsatisfactory period in the American iron trade, both among employers and workmen. The report also comments on the fact that during the year comparatively few failures resulted, though one or two heavy ones were comprised in the list, in most instances the involved firms being able to secure extensions, thus showing that their affairs were not in a hopeless state. Among the causes cited for the iron trade disasters of 1884 are the depressed condition of the export trade in agricultural products, the cessation of railway building, and the excitements attending a national election.

As compared with 1883 the year 1884 shows a diminished production of 11 per cent. in pig iron, 15 per cent. in rolled iron, not including rails, 13 per cent. in Bessemer steel rails, 71 per cent. in open-hearth steel rails, 61 per cent. in iron rails, 2 per cent. in kegs of cut nails included in rolled iron, 26 per cent. in crucible steel ingots, 1 per cent. in open-hearth steel ingots, 7 per cent. in Bessemer steel ingots and 24 per cent. in blooms from ore, pig iron and scrap.

The table presents some very striking comparisons. The inroads of cheap steel caused the great decreases noted in the production of open-hearth steel rails, iron rails, crucible steel ingots and blooms made from ore, pig iron and scrap. In no other branch was the decrease so serious. Rolled iron, Bessemer steel rails and pig iron shrunk considerably, viz.: 15, 13 and 11 per cent. respectively, but open-hearth steel ingots, nails and Bessemer steel ingots held their own remarkably well in the face of the depression in business.

As to prices, during the period from July 1883, up to and including April, 1885, old rails touched their lowest figure in December, 1884, and have since sensibly reacted. Nails reacted in January, 1885. In refined bar iron, No. 1 anthracite foundry pig, and gray forge pig, prices touched their lowest January 1st, 1885, and have remained steady at these figures during the first four months of 1885. In muck bar iron prices have not changed since the lowest figures were reached in August, 1884; steel rails reached their lowest in April, 1885.

The Southern States have shipped such a considerable quantity of pig iron to the North during the past year, that their production is a matter of much interest. Yet their production of pig iron, not counting Missouri, though much greater than in 1880, was 6 per cent. less in 1884 than in 1883, while their total production is only about one seventh of the grand total produced in the country.

While there was a decreased production of Bessemer steel ingots in 1884, as compared with 1883, and a decreased production of Bessemer steel rails, the quantity of Bessemer steel worked up into other forms than rails shows a considerable increase due to the low price and slack demand prevailing for rails, and the gradual acquisition of the skill and knowledge needed to adapt Bessemer steel to other uses.

The mass of statistics and inferences contained in such an annual report, is far too vast to permit more than a sketchy review in our columns. One feature of the report, however, is not the least interesting, and that is the statement of the feeling now existing in the iron trade with reference to the business outlook for the present year. The report refers to the meeting of the Executive Committee of the association held in February last, at which they expressed themselves with confident hopefulness with reference to the political aspects of the business situation, and stated their belief that the manufacturers of the United States were in a position to take instant advantage of any favorable change in the condition of business. Certainly if there is any one direction in which the people of the United States feel alike, it is in hoping that this spirit of confidence will be justified more and more fully as the months roll away.

The pamphlet is for sale to others than members of the Association at $2 per copy.

---

There is a plumber in this city who has failed three times during the last few months and is still doing business on his own account. We will call him Charles Jones because that is not his name. C. Jones failed, then dodged his creditors by carrying on the business in the name of his wife C. L. M. K. Jones. As soon as the concern failed under this name the oldest daughter, Sarah, was brought to the rescue and the establishment had a new sign, S. Jones. Disaster came again in the form of failure or assignment and the mantle of proprietorship fell upon Martha, another daughter. The establishment is now doing business as M. Jones, but Charles remains sole manager. Up to the time of this writing M. Jones has not "busted." We are not informed how many members are in the Jones family, but if there are two or three more daughters who have not been engaged (in business) that plumbing establishment is bound to be kept up a year or two longer.

## Accidents From Machinery.

If accounts of all the accidents to life and limb occurring in a single year from the use of machinery were collected, they would present an alarming aggregate. In many trades or occupations a man of middle life with all the members of his body intact, is the exception to the rule. And in almost every case loss of life or limb is due to carelessness on the part of those who sustain the loss. Occasionally an appalling accident occurs, the responsibility for which is clearly chargeable to employers or managers, but those instances are comparatively rare. Sometimes one sees a large belt or driving gears not fenced in, which is suggestive of a probable accident some day; but a hundred times oftener he sees men putting themselves unnecessarily in positions of danger. Men following day by day occupations attended with more or less of danger, as nearly all mechanical occupations are, come to be proverbially careless, or rather they become incapable of seeing danger where it plainly is.

Employers, or those having authority, can do a good deal to reduce the number of accidents from machinery by prohibiting dangerous practices, strictly enforcing rules to that end. Nothing short of absolute prohibition will answer; many have been discouraged, after providing safeguards, by finding that workmen would not avail themselves of them. Familiarity with dangerous things gets everyone careless; this law is universal. Passengers by railroads and steamboats must have their safety looked after by being compelled to comply with certain regulations for that purpose, and experience shows that workmen must be

similarly protected. Intelligent workmen are not as careless as the average traveler, but they are much too careless for their own good.

The *Detroit Free Press* says there are sixteen species of trees in America the wood from which could not be used for ships, because when perfectly dry it will sink in water. How about ships made of iron and steel?

The new fast train over the New York Central makes the run from New York to Chicago in 25 hours actual time, or with one hour difference in time between the two cities, apparently in 24 hours. The distance is 980 miles, and taking the actual time, the average speed is 39 3/10 miles per hour. This is remarkably good time for so long a run, but it is the opinion of experienced railroad men that the New York Central would have no difficulty in still further shortening the time. We think, however, that the traveling public will be satisfied with a thousand miles in 24 hours.

## Literary Notes.

A TREATISE ON FRICTION AND LOST WORK in Machinery and Mill-work, by Robert H. Thurston, A. M., C.E. New York: John Wiley & Sons, 15 Astor Place.

The subject of the loss of power through avoidable friction is of interest to everyone who uses machinery, and whatever will give the best results in the way of lubrication is important. The author of this work, as is generally known, has given a good deal of attention to friction and lubrication, and has been engaged for some years in experiments to bring out facts, and this volume is largely made up from data thus obtained. It is a valuable book for every one interested in mechanics, or the operation of machines and machinery.

WATER-WASTE PREVENTION: Its Importance and the Evils Due to its Neglect, with an Account of the Methods Adopted in Various Cities in Great Britain and the United States. By Henry C. Meyer, Editor of the *Sanitary Engineer*. With an Appendix. New York: The *Sanitary Engineer*.

The author of this timely book is particularly adapted to deal with the questions he discusses. But few have given the subject so much attention, and no one could treat it more impartially. He is not only intimately acquainted with the water supply of American cities, but has personally investigated the plans adopted for curtailing water waste in various cities in Great Britain, the results of these investigations appearing in this work.

As our cities increase in population, and new cities spring up, the demand for more water correspondingly increases. At the same time the water supply is diminishing, and that which would otherwise be available is rendered unfit for use by the contamination of sewage and the refuse of manufactories. It is conceded that the inhabitants of a city should be supplied with all the water they can use. It is not with the *use*, but with the *waste* of water that the author deals.

Writers for the daily press find fruitful themes for animadversions on the wrongfulness of in any way restricting the water supply, and, together with those disposed to generalize on the subject, contrive to throw obstacles in the way of any proposed plan for restricting the waste of water. A perusal of this book will satisfy any candidly-disposed person that the logical outcome of the present senseless waste of water in many American cities—New York City, for instance—will be to restrict its necessary and desirable use, and that the only way to avoid this calamity is to prevent, as far as may be, its waste.

Mr. Meyer does not deal in unsubstantial argument, but details plans employed in American and European cities. No patented appliances are recommended, but such simple means as are free to all. We commend the careful reading of this little book to every resident of a city who is interested in its water supply, and particularly to those who, by virtue of vested authority, have to some extent the matter of water-waste prevention in their hands. The price is $1.

# Questions and Answers.

*Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.*

*Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.*

(179) E. D., Philadelphia, Pa., asks questions about safety valves which he will find illustrated and explained in an article in the AMERICAN MACHINIST of Dec. 6, 1884. The same kind of files are used for brass as for iron.

(180) F. D., Rochester, Minn., asks: What do you think of the advisability of using West Virginia oil in the steam pipes of injectors to keep them from liming up when hard water is used? *A.*—We not do think it would accomplish the purpose.

(181) J. P. D., Chicago, Ill., asks: Is there any rule for the distance apart of the points at which the eccentrics are attached to a link, and does it vary with the travel of valve? *A.*—There is no rule for this. From 2 1/16 to 3 1/16 times the full travel of valve is about the practice.

(182) H. B. C., Newman, Ga., asks: 1. What kind of coupling is used when the engine is coupled direct to shaft, and do you consider it good practice to couple in this way? *A.*—Plain flange couplings are very generally used. You will find a coupling that is designed to compensate for shafts slightly out of line illustrated in the AMERICAN MACHINIST of July 1, 1882. Such practice is good in the case of high-speed engines. 2. Is there any work published giving special information on the subject? *A.*—No.

(183) O. S., ———, asks some questions about worm gearing, and gives references which we do not quite understand. As he wants to know the leverage gained by a winch and worm gearing in lifting a weight, if he will calculate how much faster the point at which the power is applied travels than the weight is raised he will have the leverage in favor of raising the weight. Thus, if the handle moves 10 feet while the weight is raised one foot, then if there was no friction an exertion of one pound weight on the handle would raise a weight of 10 lbs., etc.

(184) E. A. O., Baltimore, Md., writes: A 14" pulley on a shaft makes 130 revolutions per minute and balances 40 lbs. on a friction brake 4' from center of shaft. What is the horse-power? *A.*—The 40 lbs., if moving, would describe a circle 8 feet diameter, or 25.1328 feet circumference, hence the power is:

$$\frac{25.1328\times130\times40}{33000}=3.96 \text{ horse-power.}$$

If the lever is not balanced, allowance must be made for added weight.

(185) J. M., Philadelphia, Pa., asks: 1. Is coal, either anthracite or bituminous, injured by exposure to the weather? *A.*—Yes. 2. Is there in use any device for smoke prevention that has proven successful? *A.* There are many arrangements of furnaces that in some degree prevent smoke, but none that are only in a measure satifactory. 3. Is water condensed from exhaust steam injurious to a boiler? *A.*—In some instances it is claimed to be injurious. Sometimes oil from the cylinder is returned to the boiler, doing damage. Generally speaking, there is no trouble in its use, but it is probably always better to use a little other water with it.

(186) J. A. B., Collingwood, Ontario, writes: We are preparing to pump the water required by us—3,000 gallons in ten hours. The suction pipe will be about 500 yards long, and the pump will have to lift the water about 10 feet, and the water will be forced 20 feet high. Do you think we can accomplish this, or is the suction too long? If practicable, what power will be required? Would it be possible to make a siphon of suction pipe, and pump out of a well supplied by it? We propose to use 2" suction pipe. *A.*—Do not try to siphon water. Take great care to get the suction pipe perfectly tight, and with as few abrupt bends as practicable, and use a tight foot valve in suction pipe, so as to hold it full of water when the pump is not running; then you should have no trouble. Power required less than 1 horse.

(187) R. A., New York, asks: 1. Knowing that an engine cuts off at any point, say 1/4, 1/2, or 3/4-stroke, how shall I find from the tables the hyperbolic logarithm from which to calculate the mean effective pressure, or is it necessary to know the stroke in inches? *A.*—Divide the denominator of the fraction by the numerator, and the quotient will be the number against which to look for the required hyperbolic logarithm. Say the cut-off is at 3/4-stroke, then 4÷3=1.333, against which you should look in the table. It makes no difference whether the stroke is 4 inches or 4 feet. 2. You say in answer to a question, that in superheating steam in a close vessel the temperature and pressure are both increased. How fast is the pressure increased? *A.*—It is not known with certainty. It increases rapidly at first, but soon appears to reach the condition of a perfect gas, when the pressure is doubled for about 490° increase in temperature

# Business Specials

*Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.*

Curtis Pressure Regulator and St'm Trap, June 6, p 13

Edw. Sears, wood engraver, 48 Beekman, St., N.Y

Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

The Best Upright Hammers run by belt are made by W. P. Duncan & Co., Bellefonte, Pa.

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John street, N. Y.

Tools for amateur and foot-power lathes. Send for illustrations. Hartford Tool Co., Hartford, Ct.

Light fine interchangeable mach'y to order. Foot lathe catalogue for stamp. E. O. Chase, Newark, N.J.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Split pulleys cheaper than plain ones. Trial orders solicited. York & Benton, Cleveland, Ohio.

Universal grinders for lathe-centers, chucks, angles, or cylinders. C. C. Hill, 84 Market st., Chicago, Ill

Engine Lathes, Hand Lathes, and other fine tools. Assortment large: prices low. Frasse & Co., 62 Chatham St., N. Y.

The outline ("wax process") engravings shown in the AM. MACHINIST each week are made by Struthers, Servoss & Co., 32 Frankfort Street, N. Y.

Farley's Reference Directory of the Machinists, Iron, Steel, and Metal-Working trades of the United States. A. C. Farley & Co., Philadelphia, Pa.

"Complete Practical Machinist," $2.50; "Mechanical Drawing Self-Taught," $4. Books for workmen Joshua Rose, Box 3306, New York City.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Heavy second-hand 18 x 36 engine for sale. Send to Frick Co., Waynesboro, Pa., for prices and a list of second-hand engines and boilers, all kinds, and in good order—prices low.

Morrison's Practical Engineer, a complete treatise on steam and general machinery. Price, $1; mailed free. Indicators, Engineers' Instruments and outfits. W. A. Morrison, Box 373, Lowell, Mass

Locomotive Engine Running and Management. By Angus Sinclair. Price $2, An excellent book for men interested in steam engineering, valve setting, designing valve motion, the care of the Westinghouse brake, etc. Published by John Wiley & Sons, 15 Astor Place, N. Y.

Every young man who aspires to be either a mechanic, merchant, or manufacturer, owes it to himself that he become thoroughly familiar with the writings of Chordal. John Wiley & Sons, 15 Astor Place, N. Y., have issued a new and enlarged 12 mo. edition of "Extracts from Chordal's Letters." Handsomely bound in cloth, with over 50 illustrations. Price, $2. Discount of 25 per cent. on orders for five or more copies.

# Manufactures.

H. Mills will erect a $6,000 factory at 189 Orchard Street, Detroit, Mich.

The Messrs. Duty, Monroe, La, will build an iron covered machine shop.

Myers & Cole, Laurens, S. C., are building a foundry and machine shop.

G. A. Crosby & Co., of Chicago, are enlarging their machine shop about a third.

The Ludington (Mich.) Iron works are to be enlarged and new machinery added.

It is reported that Martin Garrity, of Cincinnati, Ohio, will establish a carriage factory at Warsaw, Ky.

J. H. Aiken, of Adrian, Mich., is reported as contemplating establishing bronze works in Dallas, Texas.

The Schenectady Locomotive Works, Schenectady, N. Y., are building at the rate of 10 locomotives per month.

R. S. Minger, of Mexia, Texas, contemplates establishing a factory at Dallas for manufacturing cotton presses, etc.

W. D. Lathrop & Co., Elizabeth City, N. C., are preparing to enlarge their cotton seed oil mill and put in more machinery.

The Cooke Locomotive Works, Paterson, N. J., have an order for four locomotives of the Forney type, for the Staten Island Railroad.

The Scranton (Pa.) Republican assures its readers that the $100,000 necessary for starting an axle works in that place will be subscribed.

It is rumored that the Barnum-Richardson Carwheel Company are talking of removing from Salisbury, Conn., to one of the Sound ports.

The Washington Steel Works, Reading, Pa., is a new establishment that will make steel castings. An old foundry is being rebuilt for the purpose.

Reese & Moore, Pittsburgh, Pa., have recently completed a steel steamboat for river service, 90 feet long, 22 feet beam, and 3 1/2 feet deep, to go to Mexico.

The Jackson Agricultural Company, engaged in the manufacture of harvesting machines, have moved their manufactory from Jackson to Detroit, Mich.

The Greenfield Tool Company, of Greenfield, Mass., are enlarging their building next to the railroad track. It will be of brick, 35x190 feet, two stories high.

Twenty thousand dollars' worth of stock for a shoe factory in Rutland, Vt., remains unsubscribed for. The proposed factory would employ between 50 and 100 hands.

The Waters paper boat factory, at Lansingburgh, N. Y., will probably construct three astronomical domes, out of paper, for the Belgian Government, at a cost of $20,000 or $30,000.

The new factory of P. & F. Corbin, at New Britain, Conn., will, when completed, make a continuous line of factory buildings on the east side of Orchard Street, of 400 feet.

Samuel T. Williams, Baltimore, Md., writes us that he expects to move his machine shop to larger quarters and build his engine in all sizes. The present location is Fayette and Frederick Streets.

The Brady Manufacturing Co., Brooklyn, N. Y., are receiving orders for the Williams automatic check punch quite as fast as they are able to fill them. Business in their other departments is also brisk.

The Boston *Commercial Bulletin* says a turbine water wheel at a Seymour, Conn., factory is yet so frozen up that it cannot be started. That factory should have a steam engine to run about 8 months of the year.

The Denison Cotton Company, Denison, Texas, the organization of which was reported last week, will expend about $25,000 in machinery for ginning cotton and manufacturing cotton seed oil. Capital stock, $50,000.

F. W. Richardson, Troy, N. Y., reports his business in balanced slide valves to be very good. During a recent trip South he took several orders from roads that have not as yet used balanced valves on locomotives.

The Northfield, Ohio, Plow Works are to move to New Castle, Pa., and $25,000 worth of new stock has been subscribed by citizens of the latter place. A new building, 85x40 feet, will be erected, and 25 men employed at first.

The Foster Stove Company, of Ironton, Ohio, have about half completed their building, and have purchased a 12x24-inch engine, and ordered patterns for a full line of cook stoves, ranges and heating stoves. They will probably be in operation by the middle of July.

The Wooden Pulley Manufacturing Company, of Minneapolis, Minn., has been incorporated for the purpose of manufacturing wooden and other pulleys, machinery, etc. Capital stock, $25,000. W. S. Nott, President; Louis Schlesinger, Secretary; and Frank J. Stern, Treasurer, all of Minneapolis, Minn.

The Hollis Woolen Mill Company has been organized at Portland, Me., for the purpose of purchasing the woolen mills at Hollis, with a capital of $30,000, all paid in. The officers are: President, Albion Little; Treasurer, Leander A. Wade; Directors, Albion Little, Leander A. Wade, Herbert W. Robinson.

The plate mill of the Potts Brothers Iron Company, at Pottstown, Pa., which had been idle since last Fall, resumed operations on Tuesday last. The plate mill at Coatesville, formerly owned by the Coatesville Iron Company, and which has also been standing for a long time, has recently been started by the Coatesville Iron Works, which is a new organization.—*The Bulletin.*

The Milburn Gin and Machine Company, Memphis, Tenn., has just issued its sixth annual illustrated and descriptive catalogue of cotton ginning machinery and presses built by the company. The pamphlet also illustrates slide-valve and high-speed center-crank patent engines built by them, together with journal boxes, pulleys, wooden rim, split or otherwise, with patent iron centers, etc.

It is proposed that the capital stock of the reorganized Albany & Rennselaer Iron and Steel Co. be $2,500,000. Of this $1,750,000 have been subscribed, and $250,000 more pledged, leaving unpledged only $500,000, which will probably be taken in Troy. Erastus Corning puts in the present works, valued at $800,000, the cost of the furnace, estimated at $600,000, and $100,000 for a new roof on the steel works and repairs, leaving a working capital of $1,000,000.

The *Industrial World*, of Chicago, says: Some 700 square feet of ground has recently been purchased by Frederick W. Wolff, on the Chicago, Milwaukee & St. Paul Railroad track, near Division Street, upon which will be erected at once a two-story building 100x125 feet in area, and a separate office building. The new structure will be used for the manufacture of coils for ice machines and other purposes. Especial machinery is to be put in and the capacity of the new works will equal that of the present ones. Side tracks, steam, heat, and all conveniences and comforts will be provided. It is the intention to have the plant ready for operation by August 1.

E. Burbank & Co., Evansville, Ind., are working up a good business in fluor spar, which is extensively used in this country as a flux for melting iron in the foundry cupola, and also in smelting iron, copper, silver and lead. They mine the fluor spar, which is said to be of remarkably good quality, and is highly recommended by those using it as tending to keep the cupola clean and to improve the quality of the castings. Messrs. Burbank & Co. are confident of eventually getting a large export trade for the product of their mines, as they are satisfied they can deliver it in most, or all, foreign countries much cheaper than it is at present furnished.

Edwin Clark is to erect a 125 barrel flour mill at Melrose, Minn.

Thomas M. Holt proposes putting up a weave mill at Haw River, N. C., during this year.

Ambrose Webster, Superintendent of the American Watch Tool Co., Waltham, Mass., reports that his shop is running "all hands on full time," with business in good shape.

The Westinghouse Machine Company, Pittsburg, Pa., have issued a handsome illustrated pamphlet showing the Westinghouse automatic engine, as applied in the manufacture of iron and steel.

A locomotive speed clock, a German invention, is in use on one of the Northern Pacific locomotives on the Rocky Mountain division. It indicates the exact speed at which the big machine is rushing over the rail.

A. A. Hobson, Bristol, Tenn., is agent for a company which has purchased a large tract of land near Union Depot, Tenn., and proposes to put up sawmills, an extensive furniture factory, and other manufacturing enterprises.

An illustrated catalogue of emery wheel polishing and buffing machinery, of their own manufacture, together with a number of machines made by other establishments, has been issued by The Diamond Emery Wheel and Machine Company, Providence, R. I. They expect soon to issue a supplement illustrating other tools.

The following towns are constructing, or preparing to construct, water works: Adams, N. Y., (Moffet & Hines, Watertown, N. Y.; being the contractors); Mattoon, Ill.; Homer, N. Y., Ellsworth, Me.; Clyde, N. Y.; Canastota, N. Y.; Fort Plain, N. Y.; Gravesend, N. Y.; Greenfield, Mass; Anderson, Ind, and Kennebec, Me.

The Hartford (Conn.) Boiler Inspection and Insurance Company, by special charter provision, has added to its business the issuing of policies of insurance covering loss of life and injury to person due to the explosion or rupture of boilers insured by them, whether those injured or killed are in attendance upon the boiler or not.

## Machinists' Supplies and Iron.

NEW YORK, May 28, 1885.

The condition of the supply market is unchanged, both as to volume of business and prices.

Iron—In American Pig transactions are slow and the condition of the market tame. For Standard brands we quote: No. 1 Foundry, $18; No. 2, $17.50; Grey Forge, $14.50 to $15.50.

In Scotch Pig lots to arrive are sold at concessions from quoted prices, which are: Shotts, $21 to $21.50; Coltness, $21 to $21.50; Glengarnock, $19 to $19.50, to arrive; Gartsherrie, $20.50; Summerlee, $20.50; Carnbroe, $19, to arrive; Eglinton, $18 to $18.50; Langloan, $20.50; Dalmellington, $19.

Copper—The market for ingot is a little easier. Lake is held at 11½ cents; other brands, 10.60 to 11 cents, but sales are made at lower figures.

Lead—The market is inactive at 3.65c.

Tin—We quote jobbing lots of Banca, 19c; Straits and Malacca, 18¾c.

Spelter—Refined, 8c. to 8¾c.

## *WANTED*

*"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.*

Situation wanted as engineer, or to erect engines and machinery; familiar with the use of indicator. T. S. R., AM. MACHINIST.

Wanted—Situation by experienced die sinker and toolmaker; best of reference given. Address Experience, Box 1, AM. MACHINIST.

Wanted—Situation by a good machinist and experienced draftsman, with designing abilities; willing to do any kind of work in shop or office. Address J. B., AM. MACHINIST.

First-class patternmaker wants situation; machine work. Address Patternmaker, Box 379, So. Norwalk, Conn.

To make room for larger tool, will sell cheap, for cash, a planer 42"x42"x12', in good order. Address P. O. Box 2085, Bridgeport, Conn.

Proprietor of foundry near Philadelphia, Pa., would like to correspond with parties desiring to make contract for castings. G., AM. MACHINIST.

For Sale—A Crosby Improved Nickel-Plated Indicator, with 40 and 50 Springs and scales; been used but a short time, and in first-class condition. Price, $65, cash. Address Box 2, AM. MACHINIST.


CHANDLER & FARQUHAR,
168 Devonshire Street,
BOSTON, MASS.
TOOLS AND SUPPLIES
FOR
Machinists, Plumbers, Gas Fitters, Electricians, Model Makers, Roller Skate Makers, Amateurs, Etc.
Send for Catalogue B.

Established 1832.
BRADLEY'S CUSHIONED HAMMER
Over 800 in Use.
BRADLEY'S CUSHIONED HAMMER.
Stands to-day without an Equal.
It approaches nearer the action of the Smith's Arm than any Hammer in the WORLD.
SPECIAL NOTICE.
All parties making, selling or using an Upright or Helve Power Hammer having a Cushioned Vibrating Saddle, infringe our patents, and we shall hold them legally liable for the same.
BRADLEY & COMPANY, Syracuse, N. Y.

Massey's "E AND K" PATENT VISES
T. C. MASSEY
SOLE MANUFACTURER
EASTERN DEPOT LINK-BELT CO. No. 81 JOHN ST. N.Y.
CHICAGO ILLINOIS
No. 15
No LOST MOTION
WRITE FOR DESCRIPTION
SIMPLY CONSTRUCTED CONVENIENT AND DURABLE

THE BROWN SLOW RAISING QUICK STROKING HAMMER
THE BROWN HAMMER
STRIKES A BLOW WITH
DOUBLE THE VELOCITY That it Raises the Hammer.
A NEW MOVEMENT SEND FOR DESCRIPTION.
KNOWLTON MFG. CO., King St., Rockford, Ill.

$60.
Sebastian, May & Co.'s
Improved Screw Cutting
Foot or Power Lathe.
14"x40", 6' bed, price $175.
Catalogue of Lathes, Drill Presses and Machinists Tools and Supplies. Mailed on application. Lathes on Trial.
167 W. Second St., Cincinnati, O.

BEAUDRY UPRIGHT
POWER HAMMER.
NEW, SIMPLE, PRACTICAL, LOW-PRICED, CHEAP TO RUN, EQUAL TO STEAM.
TEN SIZES.
BEAUDRY & CUNNINGHAM,
Boston, Mass.
Prices, etc., on application.
Please mention this advt.

The Fireman's Guide.
A Handbook on the
CARE OF BOILERS
By KARL P. DAHLSTROM, M. E.
Crown 8vo, Cloth, 50 Cents.
E. & F. N. SPON, 35 Murray St., New York.

STEPHENS PATENT VISES.
50 Per Cent. of time and labor saved by using this solid, strong, durable, quick-working Vise. Has the improved taper, pipe and other attachments. Sold by the trade. Send for circular.
MELVIN STEPHENS, Prop'r, Office, 41 Dey St., New York.

KNOWLES PATENT STEAM PUMP
THE STANDARD.
THE BEST MADE PUMP.
THE BEST PUMP MADE.
Estimates furnished on application for Pumping Machinery of any capacity, and to work against any pressure. Air Pumps and Condensers for steam engines a specialty. Will save from 20 to 30 per cent. fuel.
SEND FOR ILLUSTRATED CATALOGUE.
ADDRESS,
93 Liberty Street, New York. KNOWLES STEAM PUMP WORKS. 44 Washington St. Boston, Mass.

The Deane Steam Pump Co., HOLYOKE, MASS.
NEW YORK. BOSTON. PHILADELPHIA. CHICAGO. ST. LOUIS.
MANUFACTURE
PUMPING MACHINERY
FOR ALL DUTIES.
Send for New Illustrated Catalogue.

Established in 1874.
CLEVELAND TWIST DRILL CO.
24 and 26 West Street, Cleveland, O.
101 Chambers Street, New York.
85 Queen Victoria St., London, Eng.

ROPER'S HAND-BOOKS FOR ENGINEERS AND FIREMEN.
These books embrace all branches of Steam Engineering. Send for Catalogue.
EDWARD MEEKS, PUBLISHER,
1002 WALNUT ST., PHILAD'A, PA.

GUILD & GARRISON,
BROOKLYN, N. Y.
STEAM PUMPS,
VACUUM PUMPS,
AIR COMPRESSORS.
SEND FOR CATALOGUE.

THOS. H. DALLETT & CO.
8 N. 21st St., Philadelphia, Pa.
Manufacturers of
PATENT
Portable Drilling Machines
VERTICAL DRILLS,
Radial Drills, Multiple Drills,
HAND DRILLS.
New Illustrated Catalogue just issued.

WATER WORKS MACHINERY A SPECIALTY.
Corresp'd'ce Solicited. POND ENGINEERING CO. ST. LOUIS, MO.

THE CAMERON STEAM PUMP.
STANDARD OF EXCELLENCE.
30,000 IN USE.
MANUFACTURED SOLELY BY
The A. S. Cameron Steam Pump Works,
FOOT EAST 23d ST., NEW YORK.

PATTERN & MODEL MAKER.
GEO. E. KNOWLES, 69 BEEKMAN ST., NEW YORK.
PATTERNS of all descriptions made and inventions PERFECTED.

BELTING CHAMPION Cheapest and most Durable in the Market.
Write for Circular and Price List to
GOODCHILD & MATTHIES, 92-94 Liberty St., N. Y.

H. W. JOHNS' ASBESTOS PACKING.
Asbestos Piston Rod Packing.
Asbestos Wick Packing,
Asbestos Mill Board and Sheathing,
Asbestos Gaskets and Rings,
Asbestos and Rubber Tape and Cloth.
Asbestos Boiler Coverings.
Asbestos Cement Felting.
Asbestos Air Chamber Covering.
Asbestos Locomotive Lagging,
Asbestos and Hair Woven Felt,
ASBESTOS ROOFING.
Asbestos Building Felt.
Asbestos Cloths, Cord, Twine, Yarn, Asbestos Gasket and Retort Cements, etc.
LIQUID PAINTS, and PURE COLORS.
DESCRIPTIVE PRICE LIST AND SAMPLES FREE.
H. W. JOHNS MFG. CO.,
Sole Manufacturers.
87 Maiden Lane, New York.
175 Randolph St., Chicago. 170 N. 4th St., Philadelphia.
Billiter House, Billiter Street, London.

HILL'S FRICTION CLUTCH.
Sent on Trial. Sold on its Merits
NO OIL ON FRICTIONAL SURFACES.
Abundant Clearance. Positive Release.
Only CLUTCH Having REMOVABLE Hub.
Send for Catalogue.
ECLIPSE WIND ENGINE CO. BELOIT, WIS.

A TREATISE ON TOOTHED GEARING
Containing complete Instructions for Designing, Drawing and Constructing Spur Wheels, Bevel Wheels, Lantern Gear, Screw Gear, Worms, &c., and the proper formation of Tooth Profiles. For the use of Machinists, Pattern Makers, Draughtsmen, Designers, Scientific Schools, &c. With many plates. By J. Howard Cromwell. 12mo, cloth, $2.
JOHN WILEY & SONS, 15 Astor Place, NEW YORK,
Publishers of Industrial Works.
*.* Mailed and prepaid on the receipt of the price.

COOKE & COMP'Y, 22 CORTLANDT STREET, NEW YORK.
PORTABLE FORGES.
Durable, light, low-priced.
For Blacksmiths, Gunsmiths, Riveters, Carriage Makers, &c. Write for Circular.

Cornell University.
COURSES LEADING TO DEGREES:
Mechanic Arts, Mathematics,
Civil Engineering,
Electrical Engineering,
Architecture, Agriculture,
Arts, Analytical Chemistry,
Chemistry and Physics,
History and Political Science,
Literature, Natural History,
Philosophy, Science,
Science and Letters.
ENTRANCE EXAMINATIONS BEGIN AT 9 A.M., JUNE 15th, AND SEPT. 15th, 1885.
For the University Register, giving full information respecting Admission, Free Scholarships, Fellowships, Expenses, etc., address,
TREASURER OF CORNELL UNIVERSITY,
ITHACA, N. Y.

BETTS MACHINE CO.
WILMINGTON, DEL.
MAKERS OF HEAVY MACHINE TOOLS
STANDARD GAUGES &c.

## NICHOLSON FILE CO.,

SOLE MANUFACTURERS OF

# FILES AND RASPS

HAVING THE INCREMENT CUT.

**Also, FILERS' TOOLS AND SPECIALTIES.**

"Nicholson File Co's" Files and Rasps, "Double Ender" Saw Files, "Slim" Saw Files, "Racer" Horse Rasps, Handled Rifflers, Machinists' Scrapers, File Brushes, File Cards, Surface File Holders, Vise File Holders, Stub Files and Holders, Improved Butchers' Steels.

Manufactory and Offices at PROVIDENCE, R. I., U. S. A.

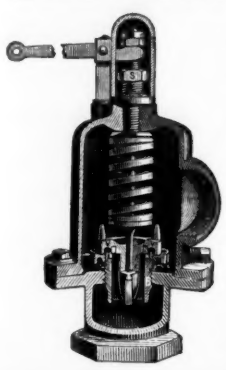
---

CHAS. A. MOORE, Pres. & Gen'l Manager. MARTIN LUSCOMB, Treas. & Secretary. GEO. W. RICHARDSON, Supt.

## THE CONSOLIDATED SAFETY VALVE CO.

CAPITAL $100,000.

Manufacturers of the Only



**NICKEL SEATED "POP" SAFETY VALVE**

*For STATIONARY, MARINE and PORTABLE BOILERS.*

Approved by BOARD OF U. S. STEAMBOAT INSPECTORS, adopted by U.S. NAVY for the STEEL CRUISERS.

Our patents have been fully sustained by the U. S. Supreme Court, Washington, D. C., and by the Decision of Jan. 19th, 1885, we were awarded

*Profits and Damages and a Perpetual Injunction against The Crosby Steam Gauge and Valve Co., For Infringement of our Patents.*

We are prepared to furnish the *Best "Pop" Safety Valve*, and considering capacity and durability it is the cheapest valve made. It also affords absolute insurance against explosion.

**Send for Illustrated Catalogue.**

SALESROOMS, 111 LIBERTY ST., N.Y. | Works, BOSTON, Mass.

---

## THE HANCOCK INSPIRATOR.

## THE STANDARD

*BOILER FEEDER FOR ALL CLASSES OF BOILERS.*

OVER 70,000 IN USE.

Send for Circulars and Price Lists.

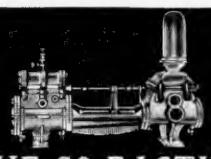
THE HANCOCK INSPIRATOR CO.,

OFFICE, 33 INDIA WHARF, BOSTON, MASS.

WORKS, BALDWIN STREET, BOSTON.

---

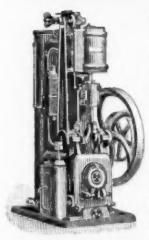
## STEAM PUMPS



SEND FOR PRICES.

VALLEY MACHINE CO. EASTHAMPTON, MASS.

---



No licensed engineer needed. Just the thing for pumping, electric lighting, driving fans, printing presses, lathes, saws, rock breakers, &c.

## THE DAVEY SAFETY ENGINE

Uses steam at atmospheric pressure, not to move the piston, but simply by condensation to create a vacuum (12 lbs.) into which the piston rushes with great velocity and power. It is built from ⅛ to 4 H.-P. The cut shows complete machine. To be seen at our store running daily, DRIVING MACHINERY.

*Circular gives full particulars.*

NEW YORK ENGINEERING CO., 64 CORTLANDT STREET. NEW YORK.

---

THE STANDARD TOOL CO., CLEVELAND, OHIO.

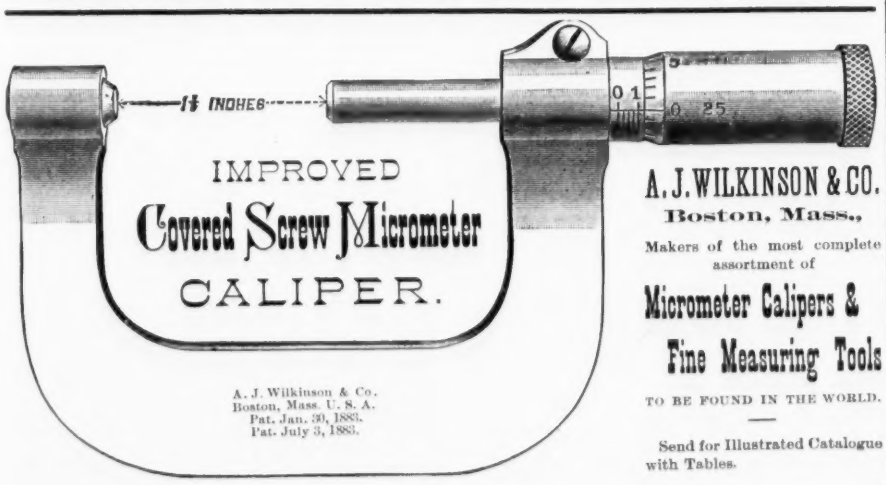
Manufacturers of STRAIGHT LIP INCREASE TWIST DRILLS and Special Tools.

---

## FRICTION CLUTCH PULLEYS AND CUT-OFF COUPLINGS.

JAS. HUNTER & SON, North Adams, Mass.

---




IMPROVED

**Covered Screw Micrometer**

CALIPER.

A. J. Wilkinson & Co. Boston, Mass. U. S. A. Pat. Jan. 30, 1883. Pat. July 3, 1883.

A. J. WILKINSON & CO.

Boston, Mass.,

Makers of the most complete assortment of

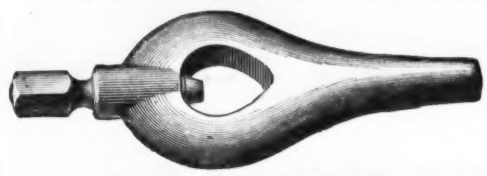
**Micrometer Calipers & Fine Measuring Tools**

TO BE FOUND IN THE WORLD.

Send for Illustrated Catalogue with Tables.

---

## REDUCED PRICES OF LeCOUNT'S STRAIGHT TAIL DOG.



To be driven from a Stud in the Face Plate.

| No. | INCH. | PRICE. | No. | INCH. | PRICE |
|---|---|---|---|---|---|
| 1 | ¾ | $0.60 | 10 | 2¼ | $1.35 |
| 2 | ⅞ | .70 | 11 | 2½ | 1.45 |
| 3 | 1 | .70 | 12 | 3 | 1.60 |
| 4 | 1¼ | .80 | 13 | 3½ | 1.80 |
| 5 | 1¼ | .80 | 14 | 4 | 2.10 |
| 6 | 1⅜ | .95 | 15 | 4½ | 2.75 |
| 7 | 1½ | .95 | 16 | 5 | 3.25 |
| 8 | 1¾ | 1.10 | 17 | 5½ | 4.00 |
| 9 | 2 | 1.20 | 18 | 6 | 5.00 |
| 1 Set to 2 in. | | 7.80 | Full Set | | 31.10 |

C. W. LeCOUNT, South Norwalk, Conn.

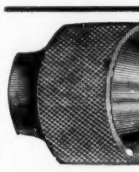
---

## THE NEW PULSOMETER.

The cheapest, strongest, most simple, compact, durable, effective and economical Steam Pump in the market, for raising liquids under and up to 100 feet. No Machinery, No Oil, No Special Care. Can be worked suspended by a chain. Will pass grit, mud, sand, pulp, etc., without injury to its parts. Needs only a steam pipe from boiler to run it. Price, 600 gallons per hour, $50; 1,200 do. $75; 3,600 do. $100; 6,000 do. $150; 10,000 do. $175; 18,000 do. $225; 25,000 do. $275; 45,000 do. $400; 60,000 do. $500; 120,000 do. $1,000.

Write for illustrated descriptive book with testimonials, etc. Mailed free. PULSOMETER STEAM PUMP CO., 83 John St., New York.

---



## Almond Drill Chuck

Sold at all Machinists' Supply Stores.

T. R. ALMOND,

83 & 85 Washington St., Brooklyn, N. Y.

---

L. S. STARRETT,

Manufacturer of

**FINE TOOLS,**

ATHOL, MASS.

Send for Full List.

---

## SHAPING MACHINES

For Hand and Power, 6", 8" and 10" Stroke.

Adapted to All Classes of Work to their Capacity.

CIRCULARS FURNISHED.

BOYNTON & PLUMMER,

Worcester, Mass.

---

## EVERY DAY CENTERS

THE PRICE OF

Illustrated in the AMERICAN MACHINIST, May 2, 1885,

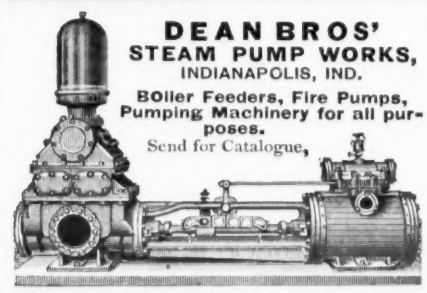
IS ONLY $20.

DISCOUNT GOES WITH EVERY PAIR.

C. E. LIPE, SYRACUSE, NEW YORK.

---

---



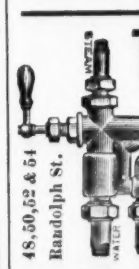
## DEAN BROS'

STEAM PUMP WORKS, INDIANAPOLIS, IND.

Boiler Feeders, Fire Pumps, Pumping Machinery for all purposes.

Send for Catalogue,

---




## THE DUPLEX INJECTOR

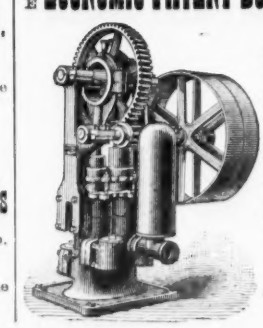
THE BEST BOILER FEEDER KNOWN.

Not liable to get out of order. Will lift water 25 feet. Always delivers water *hot* to the boiler. Will start when it is hot. Will feed water through a heater. Manufactured and for sale by

JAMES JENKS & CO., Detroit, Mich.

---

## THE ECONOMIC PATENT BOILER FEED PUMP,



Manufactured by

I. B. DAVIS & SON,

Hartford, Conn.

The Only Double-Acting Geared Pump.

It is compact and Systematic in design and Economical in its operation. All its parts are arranged for durability.

BENJ. F. KELLEY, Agent,

91 Liberty St., New York.

Philadelphia Office:

*JAMES BERRYMAN,*

125 North Fourth St.

---

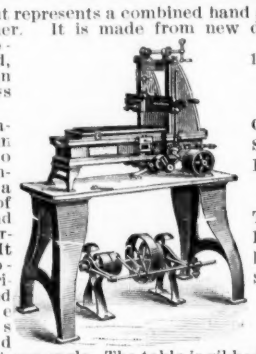
## ROOFING.

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free. Agents wanted. T. NEW, 32 John Street, New York

---

## HAND AND POWER PLANER.

THIS cut represents a combined hand and power planer. It is made from new designs, is well proportioned, and built in a first-class manner.



10"x10"x2'

Speed of Counter Shaft 170 Revs.

Size of Tight and Loose Pulleys on C Shaft, 6x2.

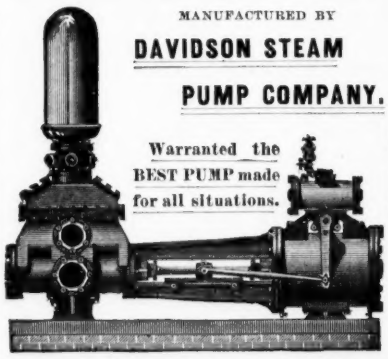
The machine is run by two belts running at a high rate of speed, and is a powerful tool. It has automatic horizontal feed and the head is graduated to plane at any angle. The table is gibbed to the bed to prevent its lifting on a heavy cut; holes in table are drilled and reamed; slot in table is milled; racks and gears are cut; sliding surfaces are accurately scraped to bearing; feed-screws are of steel with square threads; nuts, screws and wrenches are case-hardened. The machine can be run by hand power with crank by simply slipping out a gear. The tool can be depended upon to do accurate work.

With this machine is furnished a bench, counter shaft, graduated chuck, index centers, crank for hand power and necessary wrenches. Can also furnish small cutting tools if desired.

HENDEY MACHINE CO., Torrington, Conn.

---

## The M. T. Davidson Improved Steam Pump,



MANUFACTURED BY

DAVIDSON STEAM PUMP COMPANY.

Warranted the BEST PUMP made for all situations.

PHILADELPHIA AGENT: DANIEL KELLY, 51 N. Seventh St.

Principal Office, 77 Liberty St., New York.

---

## Buffalo Cupola & Forge Blowers.

Warranted superior to any other make.

All sizes and styles of every class of work.

BUFFALO FORGE CO.

Buffalo, N. Y.

Send for Catalogue and prices.

---

## WORTHINGTON PUMPING MACHINERY

HENRY R. WORTHINGTON,

New York.

Boston, Pittsburgh, Chicago, Cincinnati, Cleveland, St. Louis, San Francisco.

SEND FOR Illustrated Catalogue.

**BUSINESS CONSOLIDATION.** Dating from MAY 1, 1885, The Machine Tool Works, Frederick B. Miles, Engineer, 24th and Wood Streets, has been united with The Industrial Works, Wm. B. Bement & Son, Callowhill and 21st Streets, and hereafter the two establishments will be conducted as one concern, under the firm name of **Bement, Miles & Co.** The members of the new firm are WM. B. BEMENT, CLARENCE S. BEMENT, FREDERICK B. MILES, and WM. P. BEMENT, and the principal office will be located at CALLOWHILL AND 21ST STREETS, PHILADELPHIA. Both shops will be operated as heretofore, except that the work will be divided between the two, so as to confine the building of certain classes of

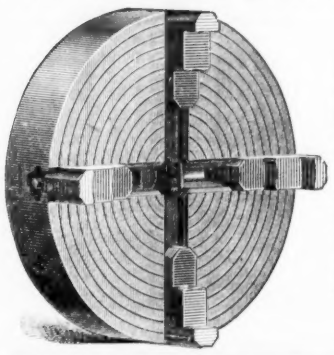
**MACHINE SHOP AND RAILWAY TOOLS,**

heretofore built by both, entirely to one establishment. Address

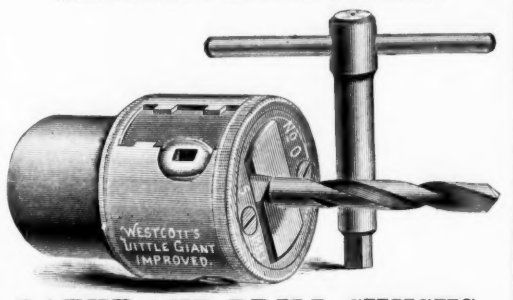
**BEMENT, MILES & CO.,** CALLOWHILL & 21st STS., PHILADELPHIA, PA.

**ONEIDA STEAM ENGINE AND FOUNDRY CO., ONEIDA, N. Y.**

Manufacturers of WESTCOTT'S PATENT

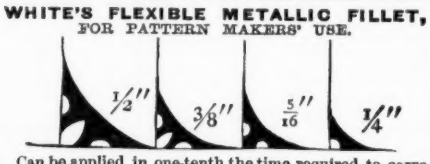


NEW CATALOGUE READY.



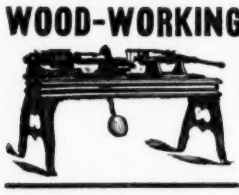

LATHE AND DRILL CHUCKS.

**WHITE'S FLEXIBLE METALLIC FILLET,**
FOR PATTERN MAKERS' USE.




Can be applied in one-tenth the time required to carve curved fillets. Send for sample. H. B. Smith Machine Co., Mfrs. of Wood Working Machinery, 925 Market St., Phila.

**WOOD-WORKING MACHINERY**



For Planing Mills, Furniture, Chair and Cabinet Factories, Cabinet Works and General Wood-Working. Send Stamp for Illustrated Catalogue to

ROLLSTONE MACHINE CO.
45 Water St.,
FITCHBURG, MASS., U.S.A.

**CYLINDER FREE OF ACID.**

*Boxes of 25, 50 and 100lbs.*

**LINDLEY M. ELKINTON,**
Manufacturer,
532 St. John Street. Philadelphia, Pa.
**TALLOW.**

J.S.GRAHAM JOHN KANE

**J.S.GRAHAM & CO.**
TRADE MARK
WOOD WORKING MACHINERY

SEND FOR CATALOGUE. FACTORY ST ROCHESTER, N.Y.

SHEPARD'S CELEBRATED

**$50**
**Screw Cutting Foot Lathe.**

Foot and Power Lathes, Drill Presses, Scrolls, Saw Attachments, Chucks, Mandrells, Twist Drills, Dogs, Calipers, etc. Send for Catalogue of outfits for amateurs or artisans. Address

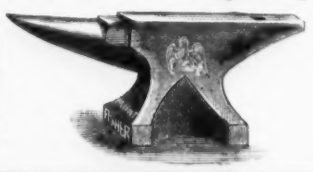
H. L. SHEPARD, AGENT,
134 E. Second St., Cincinnati, O.

**EAGLE ANVIL WORKS,**

*Trenton, N. J.*

The Fisher Double Screw Leg Vise.—Warranted stronger grip than any other Vise. Always parallel and cannot be broken.

Send for Circulars.

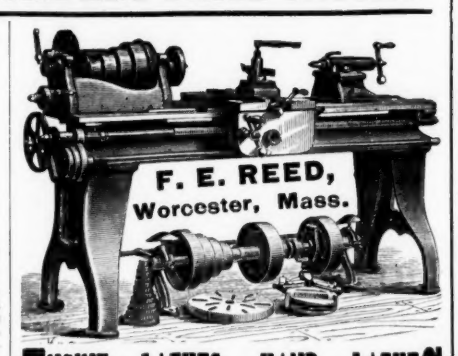


The Eagle Anvil.—Best Cast Steel Face & Steel Horn. Better than any English Anvil. Fully warranted and lower price.

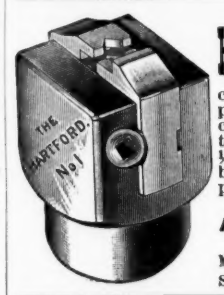
**ELEVATORS**

With Screw or Spur Gear, operated with belts or hand; Automatic Hatch Doors; Hydraulic or Steam Elevators or Hoists.

GEO. C. HOWARD,
19 S. 18th St., Phila. 12 Cortlandt St., N.Y.




**ENGINE ★ LATHES, ★ HAND ★ LATHES**
Slide Rests and Planer Centers.




—THE—
**Hartford Drill Chuck**

contains the maximum of power, durability and efficiency, and is fully guaranteed. No. 1 holds from 0 to 1/8", price $7. No. 2 (round body) holds from 0 to 3/4", price $8. Sold by the trade.

Address,
A. F. CUSHMAN,
HARTFORD, CONN.
Manufacturer of all kinds of Chucks.
Send for new Illus'd Catalogue.

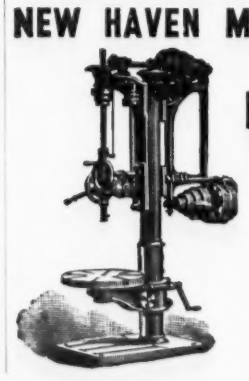
**CURRIER & SNYDER,**
**Upright Drills,**
WORCESTER, MASS.

**TACK & SHOE MACHINERY**
SWEETSER & MERRITT
BROCKTON, MASS.

Having greater facilities for **GEAR CUTTING** than we need at present we are prepared to cut accurately and with dispatch, all sizes of spur and bevel gears, from the smallest to 30 inches diameter.

**S. ASHTON HAND MFG. CO.,** TOUGHKENAMON, Chester Co., Pa.

**NEW HAVEN MANUF'G CO.,**
New Haven, Conn.



**Lathes, Planers, Shapers, Slotters, Etc.**

**ABSOLUTELY SAFE FROM EXPLOSION**
**HORIZONTAL TUBULAR BOILERS**
**ECONOMICAL**
**DRY STEAM**
**VERTICAL TUBULAR BOILERS**
**18 YEARS RECORD**

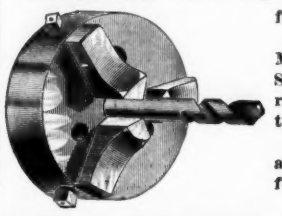
BOILERS READILY ENLARGED
STATIONARY OR PORTABLE.
IMMEDIATE DELIVERY.

CORRESPONDENCE SOLICITED.
**HARRISON SAFETY BOILER WORKS.**
GERMANTOWN JUNC. PHILA. PENNA.

GENERAL AGENTS
GRAYDON & DENTON, 115 & 117 PARK PLACE, NEW YORK.

ESTABLISHED 1851.

**The Horton Lathe Chuck,**
ALSO
**CHUCKS**



for Brass Finishers' Use, Milling Machines, Screw Machines, Upright Drills, Cutting-Off Machines, Drill Lathes, and for Boring Mills for Car Wheel and other work.

**THE E. HORTON & SON CO.**
*Canal St., Windsor Locks, Conn., U. S. A.*

**Wells Bros. & Co.**
**GREENFIELD, MASS.,**
Manufacturers of

"New Little Giant," Screw Cutting Machinery & Tools.

Adjustable Dies, Fine Taps, &c.
Adjustable Die used in all our Screw Cutting Tools.

**EUREKA BAND SAW.**

We build three sizes at prices lower than an equally good Band Saw can be had elsewhere. For further information inquire of

**FRANK & CO.,**
176 Terrace Street.
—BUFFALO, N. Y.—

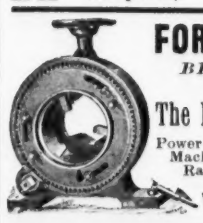
THOS. D. WEST says of
**FLUOR SPAR:**
MINED BY
B. BURBANK & CO.,
EVANSVILLE, IND.
"It not only works well in the cupolas, but is of great assistance in aiding to keep metal fluid in our large ladles, while waiting for heavy heats to run down."

Manufacturers of
**Machinists' Tools,**
WORCESTER, MASS.

**TACK, SHOE AND WIRE NAIL, AND STEEL SHANK MACHINERY.**

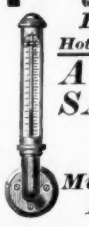
Tack Machines of the well-known Cyrus Gurney pattern, weighing from eleven hundred and fifty to sixteen hundred pounds, *acknowledged to be the best machine in the market.* Fully warranted in every particular.

**KEITH AND TRUFANT**
Campello, Mass.



**FORBES & CURTIS,**
*BRIDGEPORT, CONN.*
Manufacturers of
**The Forbes Pat. Die Stocks,**
Power Pipe Cutting and Threading Machines, Cutting-off Machines, Ratchet Drills, Special Machinery, etc., etc.
WRITE FOR CATALOGUE.
Mention Paper.

**PYROMETERS**

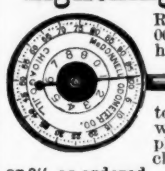


GAUNTLETT'S, HOBSON'S, and STEINER'S
*PRESSURE GUAGES*
*Hot-Well THERMOMETERS*
*ANEMOMETERS*
*SAFETY LAMPS*
*BAROMETERS*
*SALINOMETERS*
*Mining and Meteorological Instruments* of every description.

List and Description of our **Ten Catalogues** sent free on application.

**JAMES W. QUEEN & CO**
**924 CHESTNUT ST. PHILADELPHIA.**

**"Lightning" Speed Indicator**



Registers up to 1000; will stand 10,000 rotations per minute. Spindle has *Rubber Tip* (pat. app'd for) to prevent slipping, and also to break electric light current when used on dynamo. Has silver plated dial and glass crystal, excluding dust. Spindle, 1/2", 1" 2" or 3", as ordered. Sent by mail for **$2.50.** Discount to dealers.

*J. H. WALLACE, General Agent,*
2 N. La Salle Street, Chicago, Ill.

**WORK SHOPS**
WITHOUT STEAM POWER
BY USING OUTFITS OF
**BARNES' PAT. FOOT POWER**
machinery can compete with steam power. **Sold on trial.** Metal and woodworkers send for prices. Illustr'd catalogue free.
**W. F. & Jno. Barnes Co.**
**Rockford, Ill.**
Address No. 1995 Main St.

**CRANK PLANERS**
Superior Design & Workmanship, Extra Heavy (1500 lbs.)
DOWN, ANGULAR AND CROSS-FEED,
TO PLANE 12x16x15.
**R. A. BELDEN & CO., DANBURY, CT.**

NO LIMIT TO CIRCLE DRAWN.

MACHINISTS LABOR SAVING TOOLS
G & W THREADING TOOLS OLD & NEW.
WOODBRIDGE LATHE & PLANER TOOLS. 3 SIZES
STEEL "KNIFE EDGE" STRAIGHT EDGES
BORING & INSIDE THREADING TOOLS
JOHNSON'S CUTTING OFF TOOLS FOR LATHE & PLANER. SEND FOR CIRCULAR
THE HARTFORD TOOL CO. HARTFORD CONN.

EDMUND JOST, Brass Founder and Finisher,
Newark, N. J., Sept. 19, 1884.
THE BLEVNEY MANUF'G CO., Newark, N. J.

Gentlemen: I take pleasure in giving you my opinion regarding your clutches, of which I have had seven in use for the last eight months.

I find them perfect in every respect and the ease with which they are operated is remarkable.

Yours truly,
Edmund Jost.

**BEVEL GEARS,**
**Cut Theoretically Correct.**
For particulars and estimates apply to
**BREHMER BROS.,**
*Machinists,*
440 N. 12th St., Philadelphia, Pa.

**FOX AND TURRET SPEED LATHES.**
BRASS FINISHERS' TOOLS.
GEO. GAGE, WATERFORD, N. Y.
**E. P. BULLARD, Ag't., 14 Dey St., NEW YORK.**

**J. H. WILLIAMS & CO.**
COR. RICHARDS & BOWNE STS. (NEAR HAMILTON FERRY) BROOKLYN, N.Y.
IRON AND STEEL
**DROP FORGINGS**
OF THE BEST QUALITY.
NEW BUILDINGS & MACHINERY ESPECIALLY ADAPTED FOR THE BUSINESS
ESTIMATES GIVEN ON RECEIPT OF MODELS.

## MORSE TWIST DRILL AND MACHINE COMPANY, NEW BEDFORD, MASS.

*Sole Manufacturers of Morse Patent Straight-Lip Increase Twist Drill.*

SOLID AND SHELL REAMERS, BEACH'S PATENT SELF-CENTERING CHUCK, BIT STOCK DRILLS.

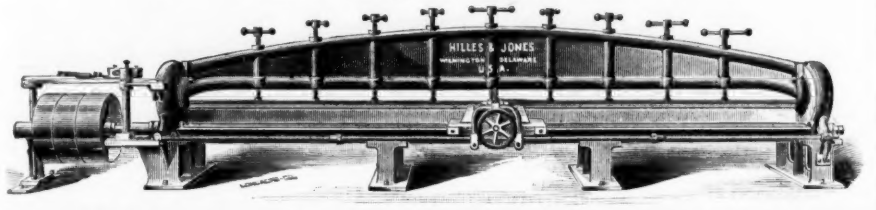
Drills for Coes, Worcester, Hunter and other Hand Drill Presses. Drill Grinding Machines, Center and Adjustable Drill Chucks, Taper Reamers, Milling Cutters, and Special Tools to order.

ALL TOOLS EXACT TO WHITWORTH STANDARD GAUGES.

GEO. R. STETSON, Sup't. EDWARD S. TABER, Pres't and Treas.

## BOILER PLATE PLANER.

**Will Plane any Length of Plate.**

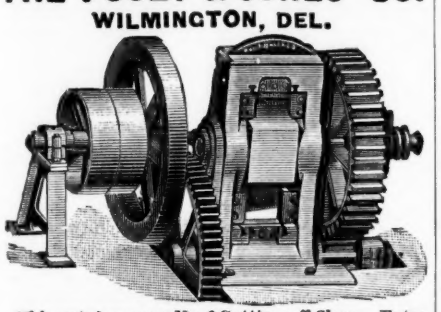



**Tools cut both ways and have independent adjustment. Table acts as a gauge for setting the Plate. Driven by a Steel Screw, which is supported its entire length so that it cannot be bent or sprung.**

## HILLES & JONES, Wilmington, Del.

## THE PUSEY & JONES CO.

WILMINGTON, DEL.



This cut shows our No. 6 Cutting-off Shear. Extra strong. For the largest size of iron rails, or equivalent bars.

Builders of **STEAM ENGINES,** Boilers, Tanks, Machinery for Rolling Mills, Punches, Shears, Riveters, Angle Iron Cutters, Cranes, and Heavy Iron Work generally.

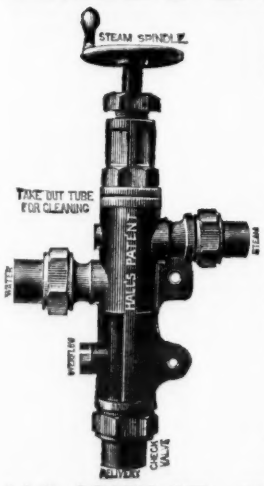
## Iron Planers AND Shapers.

SUPERIOR DESIGN AND WORKMANSHIP.

**ROCHESTER MACHINE TOOL WORKS, Lim.**

ROCHESTER, N. Y.

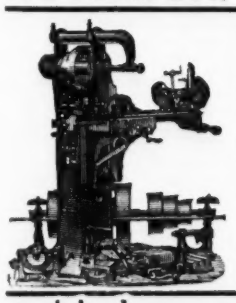
## HALL'S PATENT Automatic Injectors.




For supplying all classes of steam boilers with water. We guarantee these Injectors to be the best, simplest and only thoroughly reliable Boiler Feeders in the world, working from 2 lbs. to 200 lbs. steam pressure.

*HALL'S Engineering CO.,*

**112 JOHN ST., NEW YORK.**



Contracts solicited for Special Machines, Patent Devices, &c., in quantity.

Complete outfit for Machinists, Blacksmiths, Metal - Workers and others.

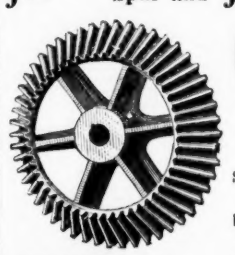
New Circular on Milling Machine and Universal Head (Pat. Pending.)

*THE CINCINNATI SCREW & TAP CO.*

S. E. Cor. Pearl & Plum Streets,

CINCINNATI, OHIO.

## MACHINE MOULDED Spur and Bevel GEARS,



Pulley Castings, &c.

Special Inducements to the trade.

List mailed on Application.

## POOLE & HUNT

Baltimore, Md.

## American Drawing INK.

Waterproof and general. A liquid substitute for India ink. Finer, blacker and more perfectly fluid than India or any other ink. Will work longer in pen without cleaning or refilling, and will never become gelatinous, thick or offensive, or deposit carbon. Send for catalogue of drawing instruments and materials to

G. S. WOOLMAN,

116 Fulton Street, New York.

American Twist Drill Company's

## PATENT CHUCK JAWS.

3 sizes. Price per set of 4 Jaws, $40, $48, $56. Bolted to lathe face plates, they make best and cheapest chuck in the world. Address orders

HILL, CLARKE & CO., Boston and St. Louis.
MANNING, MAXWELL & MOORE, N. Y. City.
TALLMAN & McFADDEN, Philadelphia, Pa.
WM. BINGHAM & CO., Cleveland, Ohio.

## DETRICK & HARVEY,

BALTIMORE, MD.

Manufacture Machine Tools and Special Machinery.

*SINGLE POST OR OPEN SIDE*

**IRON PLANERS.**

Adapted for long & wide work. Guaranteed equal to the two-post planers in am't and quality of work.

## HYDROSTATIC MACHINERY.

PRESSES,
PUMPS,
PUNCHES,

## ACCUMULATORS

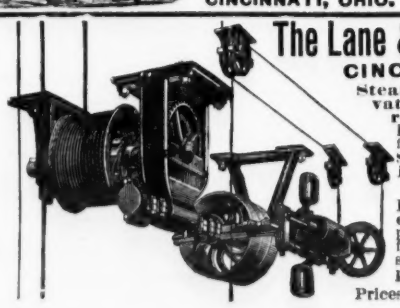
JACKS,
VALVES,
FITTINGS,

## VAULT ELEVATORS, &c., &c.

WATSON & STILLMAN, 468 Grand St. New York.

## The Lane & Bodley Co.

CINCINNATI, O.

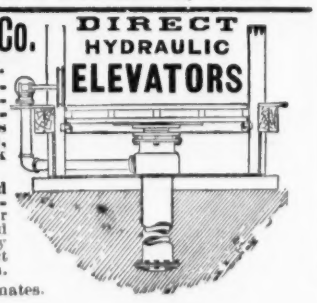


Steam Power Elevators for Factories, Hydraulic Elevators for Gas Works, Side Walk Lifts, &c.

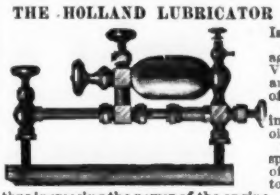
Compound Hydraulic Elevators for passengers and freight, for city service or direct pumping system.

Prices low. Get estimates.

## DIRECT HYDRAULIC ELEVATORS



## THE HOLLAND LUBRICATOR VISIBLE DROP



Is guaranteed to be:

1. A perfect insurance against the cutting of Valve seats, Cylinder, and Governor Valves of the engine.
2. It will pay for itself in 6 months in saving of oil, coal and packing.
3. It will insure more speed in the revolutions of the engine, say from 1 to 2 strokes per minute, thus increasing the power of the engine. Manufactured by

HOLLAND & THOMPSON, 217 River St., Troy, N. Y.

ESTABLISHED 1856

Buek's Watchman's Clock. with Safety Lock Attachment. 20 PRIZE MEDALS AWARDED.

To control watchmen in manufacturing establishments, public buildings, warehouses, etc.

Simplest, strongest, cheapest and most complete of its kind.

Price, with 12 keys, complete, $50. Send for Circular.

O. E. HAUSBURG, Sole Agent, 71 NASSAU ST., Room 3, N. Y.

## DRAWING INSTRUMENTS

Send for 72-Page ILLUSTRATED CATALOGUE.

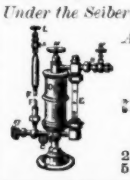
WM. T. COMSTOCK, 6 Astor Place, - New York.

## THE SEIBERT CYLINDER OIL CUP CO.

Manufacturers of

OIL CUPS FOR LOCOMOTIVE, MARINE AND STATIONARY ENGINE CYLINDERS,

*Under the Seibert and Gates Patents with Sight Feed.*



*Also The* WILKINSON CRANK PIN

Device for Marine and Stationary Engines.

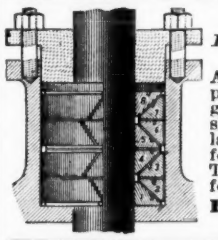
*Send for Catalogue and Price Lists.*

SEIBERT CYLINDER OIL CUP CO.,

26 Vesey Street, - - NEW YORK.
53 Oliver Street, - BOSTON, Mass.

## Katzenstein's Metallic Packing,

(SELF-ACTING)



*For Piston Rods, Valve Stems, &c.*

Adopted and in use by the principal Iron Works, Engine Builders and Steamship Companies within the last eight years in this and foreign countries; also Tubular Metallic Packing for Slip Joints.

L. KATZENSTEIN & CO., 169 Christopher St., N.Y.

## J. C. HOADLEY,

CIVIL AND MECHANICAL ENGINEER and Expert in Patent Causes,

28 STATE STREET, ROOM 28, BOSTON, MASS.

## "ECLIPSE" CUTTING-OFF MACHINE

FOR SHAFTING, ROUND IRON, ETC.

This is a simple and very effective machine, cutting all sizes from ½ to 4½ inch, inclusive. The gearing is very powerful, and the cutters can be repaired or renewed by any blacksmith. It will cut off a 4-inch shaft in twelve minutes, and for all practical purposes is as useful as a tool costing three times its price. Manufactured by

PANCOAST & MAULE,

PHILADELPHIA, PA.

*Also, "Eclipse" Pipe Screwing Machines, for both Hand and Power use.*

SEND FOR CIRCULARS.

## FRICTION CLUTCH PULLEYS,

Hoisting Engines and Hoisting Machinery,

## D. FRISBIE & CO.,

478 North 5th St., Philadelphia, Pa.

GEORGE H. BENJAMIN,

Electrical and Mechanical Engineer,

Expert in Patent Causes and Solicitor of American and Foreign Patents.

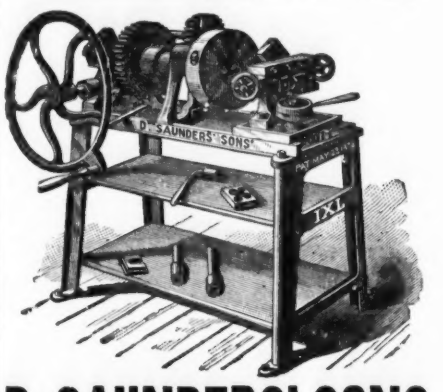
234 BROADWAY, NEW YORK.

Iron and Steel

## DROP FORGING

Of Every Description, at Reasonable Prices.

R. A. BELDEN & CO., DANBURY, Ct.




## D. SAUNDERS' SONS

MANUFACTURERS OF THE ORIGINAL

Trade I.X.L. Mark.

## Pipe Cutting AND Threading Machine.

BEWARE OF IMITATIONS.

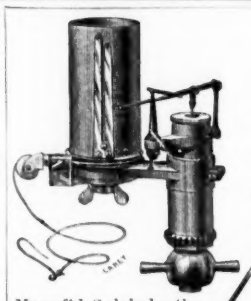
None Genuine without our Trade-Mark and Name

STEAM AND GAS FITTERS' HAND TOOLS,

PIPE CUTTING & THREADING MACHINES.

For Pipe Mill use a Specialty.

Send for Circulars. YONKERS, N. Y.



SEE REFERENCE.

Manuf'd Solely by the

American Steam Gauge Co., Boston, Mass.

PHILADELPHIA, July 22, 1884.

AMERICAN STEAM GAUGE CO., Boston, Mass.

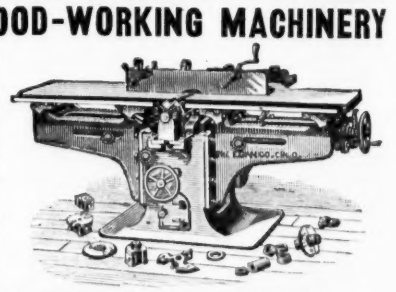
Gents—The Thompson Indicator which you furnished me has given good satisfaction. I have used it frequently upon high-speed engines with indicators of other makers, and have not yet had occasion to regret the choice which I made when I selected yours.

Respectfully yours,

H. L. BUTLER.

Engineers allowed special terms.

## WOOD-WORKING MACHINERY



New Universal Wood Worker, Planing and Jointing Side.

## THE EGAN COMPANY, Mfrs.,

Successors to The Cordesman & Egan Co.,

201 to 221 WEST FRONT ST., CINCINNATI, OHIO.

## CHARLES MURRAY,

ENGRAVER ON WOOD

58 ANN ST. NEW YORK.

## FAY & SCOTT, Dexter, Me.

MANUFACTURERS OF

## WOOD LATHES,

Drill Lathes, Shaping Machines, Milling Machines, Planer Centers, &c.

SEND FOR CATALOGUE.

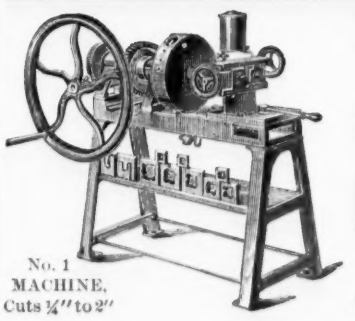
## MACHINERY

For Reducing and Pointing Wire.

Especially adapted to pointing wire rods and wire for drawing.

For Machines or information, address the manufacturer,

S. W. GOODYEAR, Waterbury, Ct.



No. 1 MACHINE, Cuts ¼" to 2"

## THE EATON, COLE & BURNHAM CO.

82 & 84 Fulton Street, New York,

MANUFACTURERS OF

PIPE CUTTING and THREADING MACHINES

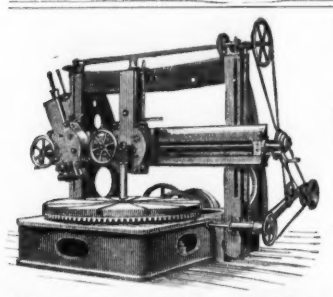
OPERATED BY HAND OR POWER.

## FITTINGS, VALVES, PIPE, PIPE TOOLS,

AND ALL STYLES OF IRON AND BRASS GOODS FOR

STEAM, WATER AND GAS.

Factory, Bridgeport, Conn.



## WILLIAM SELLERS & CO.,
Philadelphia, Pa.

Machine Shop and Railway
**EQUIPMENTS.**

Shafts, Couplings, Hangers, Pulleys, Mill Gearing, etc., Lathes, Planers, Drills, Shapers, Bolt Cutters, Railway Turntables, and Pivot Bridges, Gifford Injectors, Sellers' Improvements, New Patterns, Simple, Effective.

**New York Office, - No. 79 Liberty Street.**

---

1500 ENGINES NOW IN USE.

Send for Illustrated Circular and Reference List.

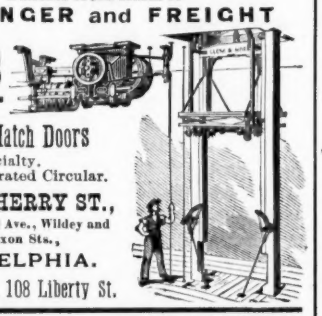
Our capacity being now equal to 100 Engines per month, we shall hereafter keep in stock for immediate shipment all sizes from 4 to 200 H. P.

THE
**Westinghouse Machine Company,**
PITTSBURGH, PA.

SALES DEPARTMENT CONDUCTED BY
WESTINGHOUSE, CHURCH, KERR & CO., 17 Cortlandt Street, New York.
FAIRBANKS, MORSE & CO., Chicago, Cincinnati, Cleveland, Louisville and St. Paul.
FAIRBANKS & CO., St. Louis, Indianapolis and Denver.
PARKE & LACY, San Francisco, and Portland, Oregon.
PARKE, LACY & Co., Salt Lake City, Utah & Butte, Montana.
D. A. TOMPKINS & CO., Charlotte, N. C.
KEATING IMPLEMENT & MACHINE CO., Dallas, Texas.
ROBERT MIDDLETON, Mobile, Ala.
H. DUDLEY COLEMAN, 9 Perdido Street, New Orleans, La.
IMRAY & CO., Sydney and Melbourne, Australia.
R. ROGERS, 43 Rue Lafitte, Paris.

---

## Morse Elevator Works
MORSE, WILLIAMS & CO.,
(Successors to Clem & Morse,)
Builders of All Kinds of
PASSENGER and FREIGHT
**Elevators**



Automatic Hatch Doors
a specialty.
Send for Illustrated Circular.
Office, 411 CHERRY ST.,
Works, Frankford Ave., Wildey and Shackamaxon Sts.,
PHILADELPHIA.
New York Office, 108 Liberty St.

---

## SELDEN'S ★PATENT★ PACKINGS.

Recommended by Leading Engineers for Steam and Hydraulic Use.

Made either *with* or *without Rubber Core.*

RANDOLPH BRANDT, 38 Cortlandt St., New York.

---

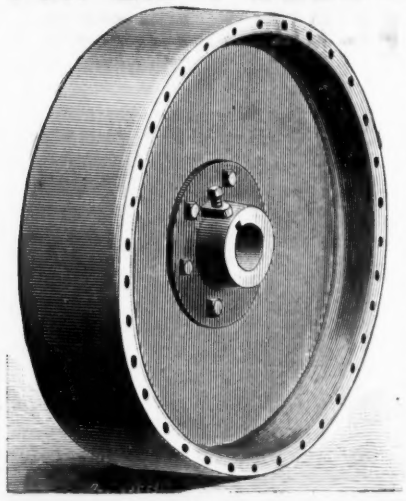
The latest improvement in TRACTION ENGINES.
Send for descriptive circular of

**TRACTION**
Portable, | Agricultural and | Stationary
**ENGINES.**

Manuf'd by WOOD, TABER & MORSE, Eaton, Madison Co., New York.

---

## PAPER PULLEYS



with WEB or ARMS.

Transmitting power, over three to one as compared with iron. No slipping belts or tighteners. Weight less than one-half. Strength and durability of the greatest. Freights less. Prices satisfactory. Send for Circular, Prices and Discounts. Also, FRICTION and POLISHING WHEELS.

**WESTINGHOUSE, CHURCH, KERR & CO.,**
Consulting and Contracting Engineers,
17 Cortlandt Street, - - - - - - New York.

Also, controlling the Westinghouse and Reynolds Corliss Engines, the Huyett & Smith Fans, &c.

---

Kellam's Steam Damper
**REGULATOR,**
Manufactured by
HIRAM KELLAM,
DETROIT, MICH.

Great economizer of fuel and a PERFECT SAFEGUARD. Made entirely of steam metal, without packing, diaphragm or stuffing box. Operated by direct steam. Guaranteed to work closer to boiler pressure than any regulator in use. Over 10,000 in use.

Send for Descriptive Circular.
Sole Sales Agents:
**HINE & ROBERTSON,**
12 Cortlandt St., New York.

---

## ARMSTRONG'S

**Improved Adjustable STOCK AND DIES FOR PIPE and BOLTS.**

Tapped to Standard Gauges. *Adjustable* to all variations in the size of fittings. Can be *resharpened without drawing the temper* by simply grinding them. Possessing practical advantages appreciated by all mechanics. Circulars sent free on application.

Manufactured by
**F. ARMSTRONG, BRIDGEPORT, CONN.**

---

## THE BEST IN THE WORLD.

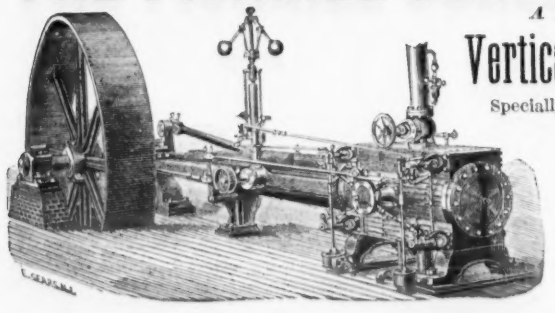
We make the Best Packing that can be made regardless of cost. Users will sustain us by calling for the "JENKINS STANDARD PACKING."

Our "Trade Mark" is stamped on every sheet. None genuine unless so stamped. ☞ Send for Price List *A*.

**JENKINS BROS.,**
71 John St., N. Y. 79 Kilby St., Boston.

---

## THE FISHKILL CORLISS ENGINE,
*A FULL LINE OF SIZES.*



**Vertical Condensing Engines**

Specially adapted for and extensively used in large grain elevators.

**BOILERS.**

Manufactured by the
**Fishkill Landing Machine Co.**
FISHKILL-ON-THE-HUDSON, N. Y.

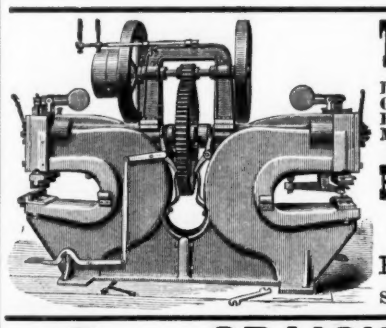
Send for Catalogue A, containing Illustrated Description and References.

---

# SOUTHWARK FOUNDRY AND MACHINE CO.

ENGINEERS AND MACHINISTS,
430 WASHINGTON AVENUE, PHILADELPHIA, PA.
PORTER-ALLEN & SOUTHWARK ENGINES.
BLOWING ENGINES, PUMPS, GAS APPARATUS,
HYDRAULIC MACHINERY, &c., &c.

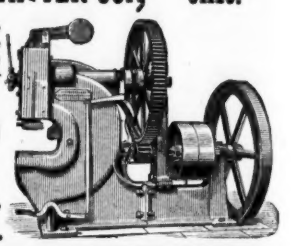
---



## THE LONG & ALLSTATTER CO., HAMILTON, OHIO.

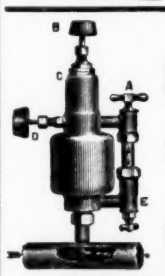
Double, Single, Angle-Bar, Gang, Horizontal, Twin, Boiler, Spacing, Gate, Multiple, Belt and Steam-Driven

**Punches and Shears,**
Over 300 Sizes.
ALSO,
Power Cushioned Hammer.



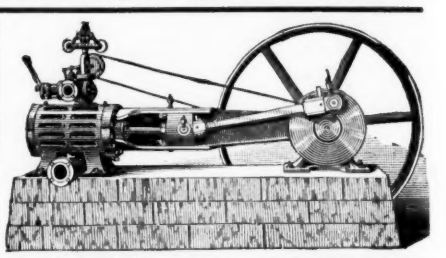
Send for New Catalogue.

---



## CRAIC'S
New "Class C" Lubricator
Manufactured by
The Craig Sight Feed Lubricating Co.
LAWRENCE, MASS.
Manufacturers of
Sight Feed Lubricators for Locomotives, Stationary, Marine, Portable & Pumping Engines.
WRITE FOR CIRCULAR.

---

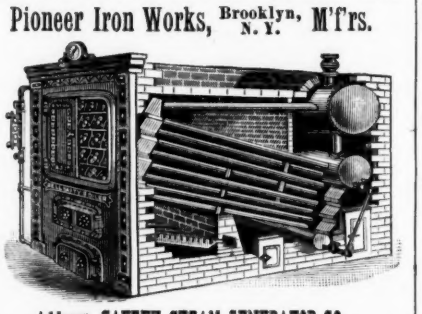


## STEARNS MFG. COMPANY,
ERIE, PA.
Engines from 15 to 400 Horse Power.
Boilers of Steel and Iron supplied to the trade or the user Send for Catalogues.
SAW MILLS and GENERAL MACHINERY.
Works at ERIE, PA.

---

## ZELL SAFETY BOILER
Pioneer Iron Works, Brooklyn, N. Y. M'f'rs.

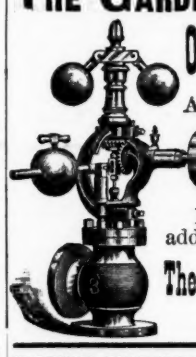
SEND FOR CIRCULAR.



Address, SAFETY STEAM GENERATOR CO.,
68 WARREN STREET, NEW YORK.

---

## THE GARDNER GOVERNOR.



**Over 30,000 in use.**

Adapted to every style of stationary and portable steam engine.

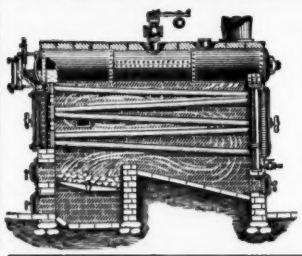
Warranted to give satisfaction or no sale.

For circulars and prices, address,

**The Gardner Governor Co.,**
QUINCY, ILL.

---

## VAN DYKE WATER-TUBE BOILER.



Cheapest and best boiler in market.

Safety, Economy, Durability.

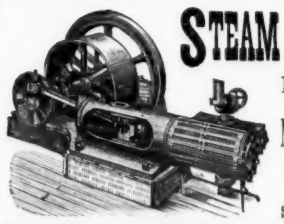
**VAN DYKE**
MFG. CO.,
60 Greenpoint Ave.
BROOKLYN, N.Y.

---

**BOUND VOLUMES OF THE AMERICAN MACHINIST**
for 1880, 1881, 1882, 1883 and 1884, cloth, $3.50 each, purchasers paying express charges.
AM. MACHINIST PUB'G CO., 96 Fulton St., New York

---

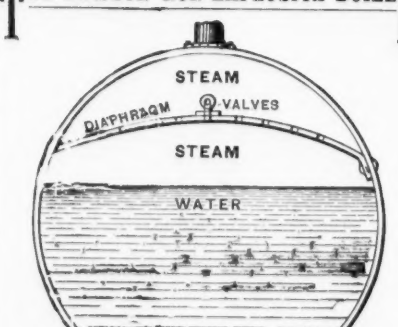
## The Beckett & McDowell Mfg. Co.



**STEAM ENGINES**
Hoists, Pumps
AND GENERAL
Mining Machinery.
120 LIBERTY ST.,
NEW YORK.
Send for Illus. Catalogue.

---

## THE LAWSON NON-EXPLOSIVE BOILER




This is the only steam boiler ever devised in strict compliance with the demands of natural laws. It gives complete immunity against explosions, delivers dry steam, prevents all incrustation and deposit on the bottom plates, affords safety with high pressure, and secures great economy. The invention is applicable to every style of boiler, and can be readily applied, internally or externally, to new or old boilers. Licenses granted on liberal terms to manufacturers. Send for description.

*Lawson Non-Explosive Boiler Co.,*
155 & 157 BROADWAY, N. Y.

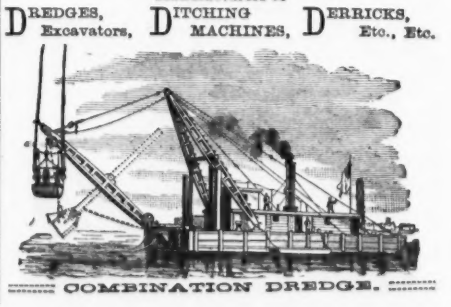
---

THE LOWE
## Feed Water Heater
AND PURIFIER.

*This heater has seamless straight tubes, brass or copper. No necessity for bent or bowed tubes, because construction provides for the differential expansion between shell and tubes. Adapted for high or low pressure engines. Saving in fuel and boiler repairs guaranteed. Least back pressure on engine. Reliable water purifier; the highest results obtained from exhaust steam. Write for "History of Feed Water Heaters," free on application, to William Lowe, Patentee and Sole Manufacturer, Bridgeport Boiler Works, Bridgeport, Conn., or to L. M. Moyes, Gen'l Sales Agent, 52 John St., New York.*

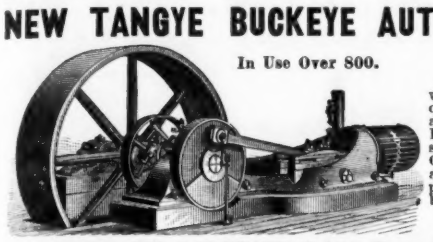
---

## OSGOOD DREDGE CO., - ALBANY, N. Y.
RALPH R. OSGOOD, Pres. JAMES H. BLESSING, Vice-Pres.
JOHN K. HOWE, Secretary and Treasurer.
Manufacturers of
DREDGES, Excavators, DITCHING MACHINES, DERRICKS, Etc., Etc.



COMBINATION DREDGE.

## NEW TANGYE BUCKEYE AUTOMATIC CUT-OFF ENGINES.



In Use Over 800.

25 to 1000 H. P.

These Engines are the combined result of long experience with automatic cut-off regulation and most careful revision of all details. They are designed and constructed for heavy and continuous duty at medium or high rotative speeds. Highest attainable Economy in Steam Consumption and superior regulation guaranteed. Self-Contained Automatic Cut-Off Engines, 12 to 100 H.P. for driving Dynamo Machines a SPECIALTY.—Illustrated Circulars with various data as to practical Steam Engine Construction and performance, free by mail. Address

BUCKEYE ENGINE CO., Salem, O.

Sales Agents: GEO. A. BARNARD, 70 Astor House, N. Y., and 53 Mason Building, Boston, Mass. | D. L. DAVIS, 34 S. Canal St., Chicago, Ill., and ROBINSON & CARY, St. Paul, Minn.

KENSINGTON ENGINE WORKS, Limited, Philadelphia,

Sole Licensees and Manufacturers for New Jersey (South of Trenton), Eastern Pennsylvania, Delaware, Maryland, and Virginia.

## CUMMER ENGINE CO.

CLEVELAND, OHIO.

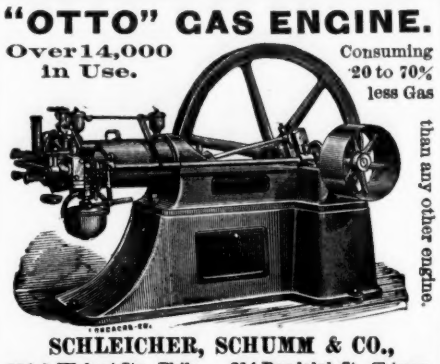
Awarded Gold Medals and All Highest Premiums for BEST AUTOMATIC ENGINE at both Cincinnati and Louisville in 1883.

Send for 150 Page Illustrated Catalogue.

## "OTTO" GAS ENGINE.

Over 14,000 in Use.

Consuming 20 to 70% less Gas than any other engine.



SCHLEICHER, SCHUMM & CO.,

33d & Walnut Sts., Phila. 214 Randolph St., Chicago.

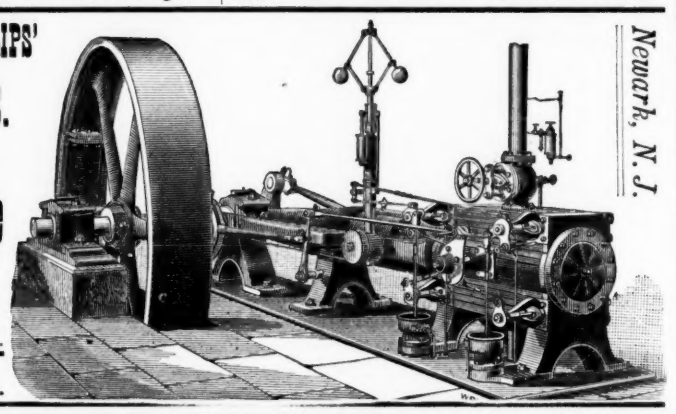
## HEWES & PHILLIPS' Iron Works.

IMPROVED

Corliss Engine

*High Pressure,*
*—Condensing—*
*And Compound.*

SEND FOR CIRCULAR.



Newark, N. J.

BUILDERS OF

BOILERS, GAS HOLDERS, GAS GENERATORS,

## WARDEN & MITCHELL,

Germantown Junc., Philadelphia.

TANKS, STILLS, BRIDGES, ETC., ETC.

Hydraulic Riveting Plant and full facilities.

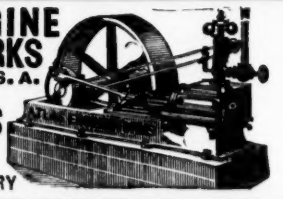
Send for Catalogue and Prices.

## ATLAS ENGINE WORKS

INDIANAPOLIS, IND., U. S. A.

MANUFACTURERS OF

STEAM ENGINES AND BOILERS.



CARRY ENGINES and BOILERS IN STOCK for IMMEDIATE DELIVERY

## DROP FORGINGS OF IRON OR STEEL

BEECHER & PECK, NEW HAVEN CONN.

## PECK'S PAT. DROP PRESS.

NEW HAVEN

BEECHER & PECK, — CONN.

## SECOND-HAND IRON WORKING MACHINERY

16 in. x 6 ft. Engine Lathe. Ames. Good order.
16 in. x 6 ft. " Harrington. Good order.
20 in. x 8 ft. " Harrington. "
46 in. x 26 ft. " Raised to swing. 52 in. Bement. Good order.
26 in. x 20 ft. Pond Engine Lathe. Good order.
24 in. x 7 ft. Harrington Chucking Lathe. A 1 order.
22x38 in. x 12 Extension Lathe. Harrington.
One 6 in. Shaper. Gould. Cheap.
One 12 in. Stroke Crank Planer. Belden.
16 in. 38 in. Planer. A 1 order.
20 in. x 4 ft. Planer. New Haven.
25 in. x 6 ft. Planer. Ames.
30 in. x 6 ft. " Smith.
36 in x 12 ft. " Niles. Nearly new.
42 in x 12 ft. " N. Y. S. E. Co. Good order.
10 in. Stroke Slotter. Hewes & Phillips.
One Universal Miller. Brown & Sharpe.
One Milling Machine. No. 2 Garvin.
One No. 7 Brainard Miller. A 1 order.
One No. 2 Miller. P. & W. Lincoln Pattern. N'ly new.
One No. 1 Miller. Hand. P. & W. Nearly new.
One 20 in. Drill, Lowell—good order.
One 20 in. Drill. Prentice. " "
One 30 in. Drill. Putnam. Good order.
One Horizontal Boring and Drilling Mach. Ames.
One 4-Spindle Drill, No. 3, Ames—nearly new.

We have a full line of new m'ch'y, and are prepared to make low quotations. Agent for the following firms. Write full particulars of what is wanted.

**NEW YORK AGENT FOR**

**Brown & Sharpe Manufacturing Co.**
**Powell Machine Tool Co.**
**Bradley's Cushion Hammer.**
**National Mchy. Co. Bolt and Nut Mchy.**
**Hilles & Jones, Boiler Tools.**
**Slate's Sensitive Drills.**
**Elliott's Drills. Gage Brass Lathes.**

E. P. BULLARD, 14 Dey St., NEW YORK.

## BLESSING'S PATENT RENEWABLE-SEAT Stop and Check Valves.

The Renewable Seats and Discs are cast from the best Phosphor Bronze Metal, which has lasting qualities, double that of the best Steam Metal commonly used in first-class valves. The Seats are simply dropped into place and held in position by bottom of cage

We also manufacture the Albany Bucket and Gravitating Steam Traps.

ALBANY STEAM TRAP CO., Albany, N. Y.

## Patent Binders

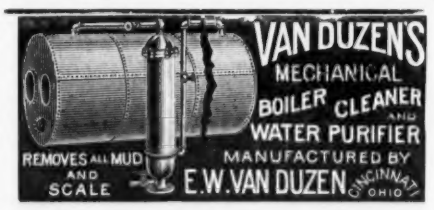
—FOR—

AMERICAN MACHINIST,

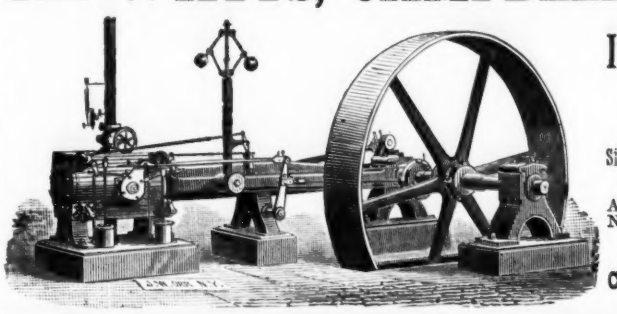
to hold 52 issues. Price $1 each, by mail or express to any part of the United States. Also "COVERS" to be applied by bookbinders for permanently binding any volume. Same price.

American Machinist Pub'g Co.,

96 FULTON STREET, NEW YORK.




## THE WATTS, CAMPBELL CO., NEWARK, N. J.



MANUFACTURERS OF

Improved Corliss Steam Engines.

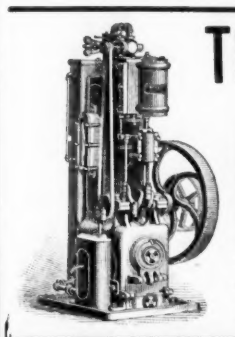
IN FULL VARIETY.

Sizes varying from 30 to 2000 H.P.

Horizontal or Vertical, Direct Acting or Beam, Condensing Non-Condensing or Compound. Send for Circular.

BRANCH OFFICE:

Cor. 5th and Chestnut Sts., PHILADELPHIA, PA.



## THE DAVEY SAFETY ENGINE

OR VACUUM MOTOR (Patented.)

NO ENGINEER.
STEAM PRESSURE.
EXHAUST.
CYLINDER LUBRICATION.
OFFENSIVE ODORS.
EXTRA INSURANCE.
EXPLOSION POSSIBLE.

*CANNOT BE*

BURNT OR BLOWN UP.

Cost of running ONE CENT per Horse Power per hour. Cheaper than GAS ENGINE. More powerful than HOT AIR ENGINE. SEND FOR ILLUSTRATED DESCRIPTIVE LIST.

CHAS. P. WILLARD & CO., 284 Michigan Street, Chicago, Ill.

## AUTOMATIC CUT-OFF ENGINE

Embodying a New System of Regulation.

The Governor Weighs the Load.

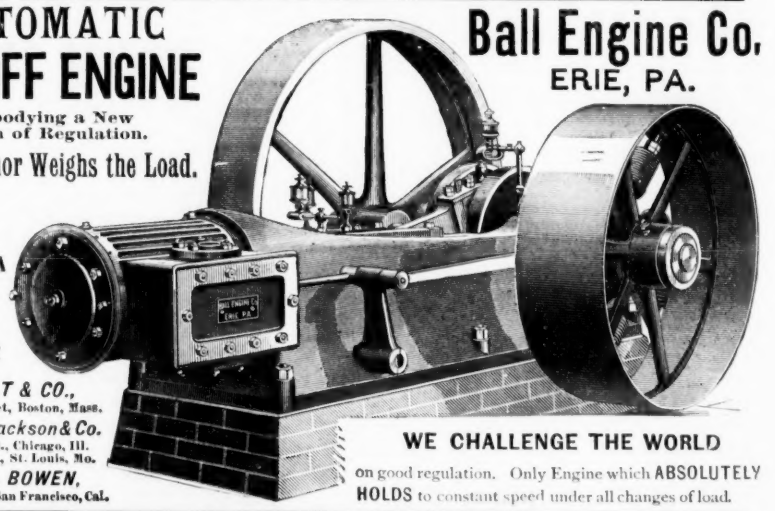
Send for Circular A

GENERAL AGENTS:

*S. L. HOLT & CO.,*
67 Sudbury Street, Boston, Mass.
*Kingsland, Jackson & Co.*
28 So. Canal St., Chicago, Ill.
823 North 2d St., St. Louis, Mo.
*TATUM & BOWEN,*
Portland, Ore. San Francisco, Cal.

## Ball Engine Co.

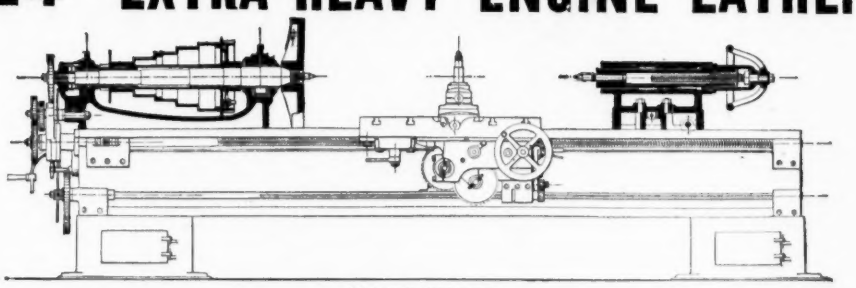
ERIE, PA.



WE CHALLENGE THE WORLD

on good regulation. Only Engine which ABSOLUTELY HOLDS to constant speed under all changes of load.

## 24" EXTRA HEAVY ENGINE LATHE.



SIDE ELEVATION.

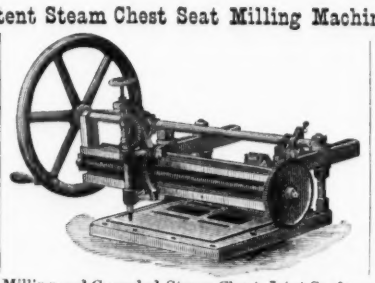
BUILT BY

## S. S. HEPWORTH & CO., GLENWOOD STATION, YONKERS, N. Y.

Prices and Particulars furnished on Application.

Patent Steam Chest Seat Milling Machine.

Circulars on Application.



Send stamp for Catalogue.

For Milling and Corroded Steam Chest Joint Surfaces for Strips, Facing off Whole Surfacing and Milling out Ports. Easily attached. Works Rapidly. Designed especially for Locomotives.

L. B. FLANDERS MACHINE WORKS,

PEDRICK & AYER, Prop'rs, Philadelphia, Pa.

## W. C. YOUNG & CO., WORCESTER, MASS.

Manufacturers of

ENGINE LATHES, HAND LATHES,

Foot Power Lathes, Slide Rests, &c.

## THE BABCOCK & WILCOX CO.,

WATER TUBE STEAM BOILERS.

30 Cortlandt Street, New York.
107 Hope St., Glasgow, Scotland.

BRANCH OFFICES:

BOSTON: 50 Oliver Street.
PHILAD'A: 32 N. 5th Street.
PITTSBURGH: 98 4th Ave.
CHICAGO: 64 S. Canal St.
CINCINNATI: 64 W. 3rd St.
NEW ORLEANS: 54 Carondelet Street.
SAN FRANCISCO: 561 Mission Street.
HAVANA: 50 San Ignacio.

Send to nearest office for circulars

## VOLNEY W. MASON & CO.,

Friction Pulleys, Clutches and Elevators,

PROVIDENCE, R. I.

## SPECIAL INDUCEMENTS.

Second-Hand Machinery for Sale.

Two Engine Lathes, 87 in. swing, 20ft. bed. Comp'd rest. Screw feed geared in face plate on each.
One Engine Lathe, 20 ft. bed, 42 in. swing.
One Engine Lathe, 16 ft. bed, 48 in. swing. Bement's make.
One Engine Lathe, 12 ft. bed, 25 in. swing. Bement's make.
One Iron Planer, planes 24 ft. long, 62 in. x 62 in. Excellent condition.
One Iron Planer, planes 16 ft. long, 42 in. x 42 in Bement's make.
One Iron Planer, planes 11 ft. long, 36 in. x 36 in. Bement's make.
One Iron Planer, planes 8 ft. long, 30 in. x 30 in.
One Iron Planer, planes 7 ft. long, 30 in. x 30 in. New Haven make.
One Iron Planer, planes 6 ft. long, 28 in. x 28 in. Halliday make.
Five Iron Planers to plane 4 ft. 6 in., 24½ in. x 24½ in.
Four Iron Planers to plane 5 ft., 20 in. x 20 in.
One 5-foot Radial Drill. Bement's make.
One 40-inch B. G. S. F. Upright Drill. N. Y. Steam Engine Co.'s make.
One 42-inch Car-Wheel Borer. Bement's make.
Two Axle Lathes.
Two Durrell's 7-Spindle Nut Tappers.
Send for lists New and Second-hand Tools, too long for publication

THE GEORGE PLACE MACHINERY CO.

121 Chambers & 103 Reade Sts.,

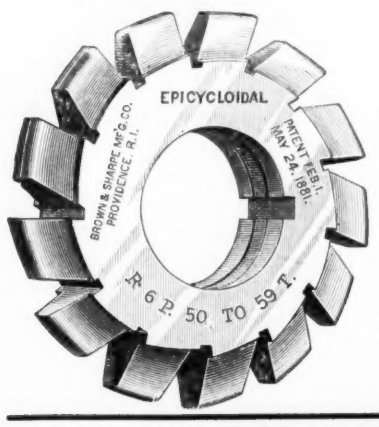
NEW YORK.

# BROWN & SHARPE M'F'G CO. PROVIDENCE, R. I.

## Patent Epicycloidal Cutters,

FOR THE TEETH OF GEAR WHEELS,

Which can be Sharpened by Grinding without changing their form.

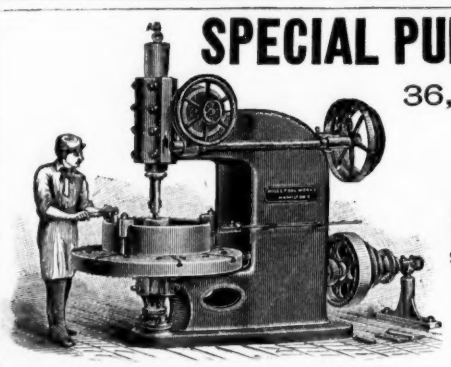


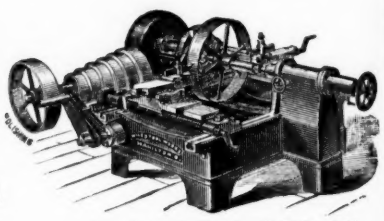

We are prepared to furnish Cutters of Epicycloidal form, which are sharpened upon the face the same as the Involute Cutters As gears of this form of teeth to run well must be cut accurately to the proper depth, that the pitch lines may coincide, we make the Cutters with a shoulder (see cut), which determines the exact depth that the gear should be cut; so that care taken in sizing the blanks obviates the necessity of any measurements in cutting the teeth. The Cutters are made for either diametral or circular pitches, and the same rules apply in finding the diameters of blanks as in our system of Involute teeth, (i. e.) 2 pitches added to the diameter at pitch line.

These Cutters will cut gears which are perfectly interchangeable. The white line on edge of the two left hand upper teeth of cut is left for the purpose of placing the Cutter central with work spindle. The Cutters are marked with letters from A to X, by which they may be ordered.

# SPECIAL PULLEY MACHINERY

36, 50 & 60 inch swing.





Corning, N. Y., April 16th, 1883.

**NILES TOOL WORKS, Hamilton, O.**

*Gentlemen:*—We are and have been greatly pleased with the **PULLEY LATHE.** . . . We use it entirely for turning Engine fly-wheels, which must be perfectly true when finished. We run three cuts over the face and sides. Such wheels, of course, cannot be turned anything like as quick as pulleys. The best we have been able to do is to **turn six 42 x 10 wheels in ten hours. This is 75 per cent. more than we were able to do with a heavy 50 inch Lathe.**

**B. W. PAYNE & SONS.**

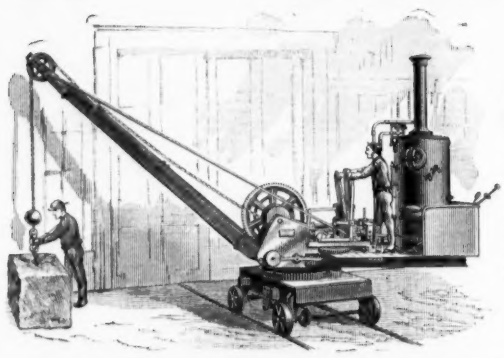
# LOCOMOTIVE CRANES,

## Hoist, Rotate and Trave

**By Power.**

—OF THE—

**Latest and Most Approved Construction.**



THESE CRANES are very useful for handling goods in a yard or on a wharf, and in bringing goods from the yard into a shop, or loading cars, as well as for other work.

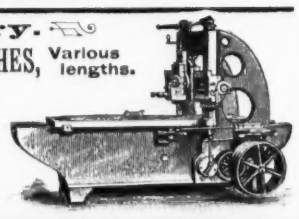
*PARTICULARS ON APPLICATION.*

# THE YALE & TOWNE MANUFACT'G CO

NEW YORK: 62 Reade St.; CHICAGO: 64 Lake St.; **STAMFORD, CT.;** PHILADELPHIA: 15 N. 6th St.; BOSTON: 224 Franklin St.

**For Immediate Delivery.**

30 in. x 30 in. PLANERS, to plane 6 ft. and 9 ft. long, also 19 in. LATHES, Various lengths.



# GREAT REDUCTION in PRICES

G. A. GRAY, Jr. & CO.

42 East Eighth Street, Cincinnati, Ohio.

# E. GOULD & EBERHARDT,

NEWARK, N. J.

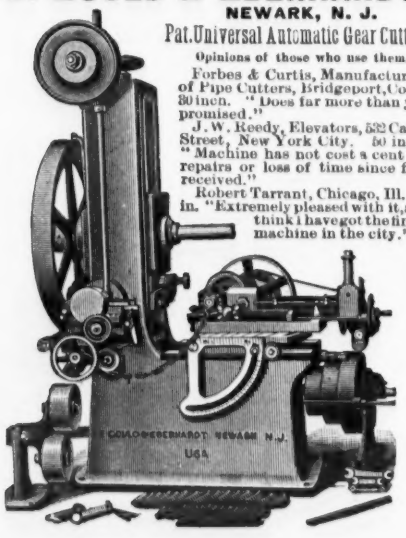
Pat. Universal Automatic Gear Cutter.

Opinions of those who use them.

Forbes & Curtis, Manufacturers of Pipe Cutters, Bridgeport, Conn. 30 inch. "Does far more than you promised."

J. W. Keedy, Elevators, 532 Canal Street, New York City. 50 inch. "Machine has not cost a cent for repairs or loss of time since first received."

Robert Tarrant, Chicago, Ill. 50 in. "Extremely pleased with it, and think i have got the finest machine in the city."




# SECOND-HAND TOOLS

*IN GOOD ORDER.*

| | | | |
|---|---|---|---|
| Universal Milling Machine | Brown & Sharpe | | |
| Lincoln Pat. " " | Putnam | | |
| Column " " | Newton | | |
| No. 5 " " | S. & Garvin | | |
| Nos. 2, 4 and 5 " " | E. E. Garvin & Co. | | |
| Planer, 20x22x5 ft. | Wheeler | Planer, 17x17x4 ft. | Whitcombe |
| " 16x16x3½ ft. | Hendey | Crank " 16x16x ft. | Belden |
| Gear Cutter, Automatic, for Spur Gears, | E. E. Garvin & Co. | | |
| " " " Bevel " | Brown & Sharpe | | |
| Screw Machine, No. 3, with Wire Feed | Pratt & Whitney | | |
| " " No. 2, " " " | " | | |
| " " No. 3, no " " " | " | | |
| Profiling Machine, 1 Spindle | E. E. Garvin & Co. | | |
| Oval Turning Lathe, Chuck 2 in. out of center. | | | |
| Upright Drill, No. 1 ⅝, 19 in. swing | Blaisdell | | |
| Gang Drill, No. 0, 4-spindle | Pratt & Whitney | | |
| " " No. 1, 4-spindle | " | | |
| " " Nos. 1, 2, 3 and 4 | E. E. Garvin & Co. | | |
| Speed Lathes, 10 and 12 in. swing | " | | |
| " " 12 in. swing and Slide Rest | Townsend | | |
| Cutter Grinder | E. E. Garvin & Co. | | |
| Engine Lathe, 36x16 ft. | Pond | | |
| " " 30x16 ft., NEW | " | | |
| Radial Drill, No. 1, | Niles | | |
| Plain Turning Lathe, 15x4 | Porter | | |

Also a variety of new tools of different makes.

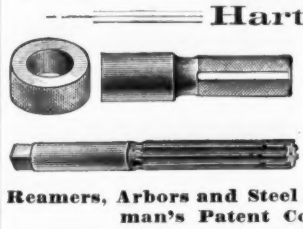
The above tools are in good order and will be sold cheap for cash. Address

**E. E. GARVIN & CO.,**

139, 141 and 143 CENTRE STREET, NEW YORK.

# THE PRATT & WHITNEY CO.

Hartford, Connecticut.



MANUFACTURE STANDARD SIZE

**Cylindrical and Caliper Gauges,**

**And End Measure Test Pieces. Straight and Taper Solid Hand Reamers, Chucking and Shell Reamers, Arbors and Steel Mandrels, Corundum Wheels, Cushman's Patent Combination Lathe Chuck.**

PRICE LIST and DISCOUNT SHEET furnished on application.

# THE BILLINGS & SPENCER CO., HARTFORD, CT., U. S. A.

MANUFACTURERS OF

**BILLINGS' Drop Forged LATHE DOGS.**

FORGED FROM THE BEST IRON AND STEEL FOR THE PURPOSE.

A Full Line in Stock.

**Drop Forgings**

OF EVERY DESCRIPTION.

# WARNER & SWASEY,

MACHINE TOOLS CLEVELAND, OHIO.

*For IRON and BRASS WORK.*

Illustrated Catalogue on application.

**Engine Lathes, Planers, Drills, &c.**

SUCCESSORS TO **DAVID W. POND,**

**POND MACHINE TOOL CO.,**

New Designs, Quick Delivery. Great Variety. Worcester, Mass.

# GEO. W. FIFIELD,

MANUFACTURER OF

## ENGINE LATHES

FROM 16 to 48 IN. SWING.

Cuts, Photographs and Prices furnished on application.

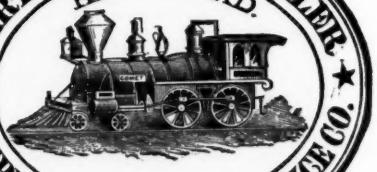
Lowell, Mass., U. S. A.

**GEAR WHEELS and GEAR CUTTING.**

Gears cut or made to order. Of every kind, spur, bevel, worm, rack, ratchet, internal, etc. Of any size, from a quarter-inch to six feet diameter. In any material. In any quantity. Small gears on hand for free delivery by mail. Send for illustrated price list.

GEO. B. GRANT, 66 Beverly St., Boston.

# HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.




J. M. ALLEN, PRESIDENT.

W. B. FRANKLIN, VICE-PRESIDENT.

J. B. PIERCE, SECRETARY.

# KEY SEATING MACHINES

AND

**20 in. Drills a specialty.**

**Our 20 in. Drill** is a heavy substantial tool, made for service, has steel shafts and spindle. Gears and racks cut from the solid and have all modern improvements, are made by special machinery, and sold very low.

**Our Key Seating Machine** will save enough in 60 days' use to pay first cost; no shop can afford to do without one. We have now ready for prompt shipment, both Key Seat Machines and 20 in. Drills. Send for Photo. and Catalogue.

W. P. DAVIS, North Bloomfield, N. Y.

# PUNCHING PRESSES,

Dies and other Tools for the manufacture of all kinds of SHEET METAL GOODS, Drop Forgings, &c.

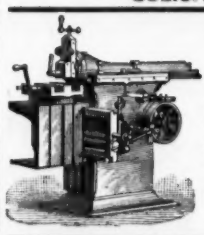
Stiles & Parker Press Co., Middletown, Conn.

BRANCH FACTORY AND OFFICE, 59 DUANE STREET, N. Y.

# THE BUFFALO STEEL FOUNDRY, BUFFALO, N. Y.

ORDERS AND CORRESPONDENCE SOLICITED. | PRATT & LETCHWORTH, Proprietors.

## THIS SHAPER HAS 26-INCH STROKE.



All the adjustments are made without operator moving from his position. It is made to act as a SLOTTING MACHINE, and is so arranged that KEY SEATS may be cut in any part of a shaft of any length, and from 4 inches in diameter down, and will plane a block 26″x26″x20″. Has SWIVEL GRADUATED VISE, two changes of speed, and is geared 36 to 1. It is very heavy and powerful, and is guaranteed to give perfect satisfaction.

Manufactured by **LODGE, BARKER & CO.,** CINCINNATI, O.

*Manufacturers of Iron and Brass-Working Machinery.*

Manufacturer of TAPS AND DIES